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BY- SCHENKKAN, R.F. AND OTHERS
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MICROWAVE TRANSMITTERS WERE USED TO LINK 11 INSTITUTIONS OF HIGHER LEARNING IN THE CENTRAL TEXAS AREA. THIS DEMONSTRATION WAS PLANNED AS A PILOT PROGRAM FOR THE USE OF MICROWAVE CHANNELS TO ACHIEVE A SINGLE CLOSED-CIRCUIT SYSTEM AMONG A NUMBER OF INSTITUTIONS. THE OBJECTIVES WERE (1) TO DEMONSTRATE THE FEASIBILITY, BOTH ECONOMIC AND PROGRAMMATIC, OF SUCH A SYSTEM, (2) TO MAKE IT A VIABLE, PERMANENT OPERATION, (3) TO EXPLORE THE PROBLEMS AND SOLUTIONS WHICH WOULD EMERGE IN ITS ESTABLISHMENT, AND (4) TO PROVIDE A PILOT PROJECT FOR SIMILAR DEVELOPMENTS THROUGHOUT THE NATION. OTHER REPORTS IN THIS SERIES ARE ED 003 734 THROUGH ED 003 737. (TC)

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TEMP

Texas Educational Microwave Project

by R. C. Norris, L. D. Haskew, and Fillmore Sanford

Edited by R. F. Schenkkan

A final report on the first two full years of operation of the Texas Educational Microwave Project submitted to The United States Office of Education, Department of Health, Education, and Welfare, Educational Media Branch.

Submitted by

R. F. Schenkkan
Project Director

July, 1963

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TEMP ADMINISTRATIVE STAFF

R. F. Schenkkan
Project Director

R. C. Norris
Project Coordinator

Fillmore H. Sanford
Project Research Director

N. W. Willett
Project Technical Supervisor

Joe A. Bailey
Assistant to the Project Director
(1959-1961)

Eugene Nelson
Academic Coordinator
(1959-1960)

TEMP ADMINISTRATIVE COUNCIL

L. D. Haskew
The University of Texas, Austin

Durwood Fleming
Southwestern University, Georgetown

J. J. Seabrook
Huston-Tillotson College, Austin

Brother Raymond Fleck
St. Edward's University, Austin

John G. Flowers
Southwest Texas State College, San Marcos

Martin Cole
Texas Lutheran College, Seguin

S. Thomas Greenburg
Incarnate Word College, San Antonio

W. P. Moody
San Antonio College, San Antonio

James W. Laurie
Trinity University, San Antonio

John McMahon
Our Lady of the Lake College, San Antonio

Father Charles W. Neumann
St. Mary's University, San Antonio

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INTRODUCTION

The Texas Educational Microwave Project is a National Demonstration Project of the United States Office of Education funded under Title VII of the National Defense Education Act. Substantial assistance was given by The Ford Foundation under its College Faculty Released-Time Program for Television Instruction.

In essence, the demonstration is a simple one: eleven institutions of higher learning in the Central Texas area are linked together by microwave transmitters in a single closed-circuit system. The institutions are representative of nearly the whole gamut of American institutions of higher learning: public and private, Protestant and Catholic, senior and junior.

With the exception of a smaller-scale broadcast experiment among three state institutions and one private college in Oregon, this has been a pioneering effort. The closed-circuit aspect, the use of microwave channels for this purpose, the diversity and number of cooperating institutions were entirely new developments in the use of television for direct classroom instruction. This has not been a research project, although research was undertaken and is reported in the final chapter; it is a demonstration, a practical pilot program.

The assumptions made were simple: closed-circuit television instruction is effective, it is possible for a number of institutions to share such instruction.

The objectives were likewise simple: to demonstrate the feasibility, both economic and programmatic, of such a system, to make it a viable, permanent operation, to explore the problems and solutions which would emerge in its establishment, to provide a pilot project for similar developments throughout the nation.

This report is a study of what was done and what was learned in the development and operation of TEMP from July 1959 to August 1962.

PART I

DERIVATIONS FROM THE PROJECT

PART I

DERIVATIONS FROM THE PROJECT*

The TEMP Project was out in an earnest attempt, conducted amidst all the practical realities of one educational and financial setting, to use instructional television constructively and beneficially. It was undertaken to be permanent, to become fit to survive. But, it was also conceived as a pilot project. That is, it was supposed to generate from observed experience some generalizations which might be valuable to others who undertake or contemplate a similar mission. This chapter presents some of those derived generalizations.

A. Implementation

This Project had no precedent master plan and no prototype to guide implementation; in one sense it was implemented by creating problems and then attempting to solve them by what appeared to come naturally. To a degree, such improvisational status led to disturbing frustrations. It was difficult for college representatives to accept a pilot rationale; they, and many times the executive staff, were expecting the certainties and semi-perfections of a finished, tested product. Constantly, requests were made for assurances which could not be given; experimentalism as an attitude was uncommon at the outset. Considerable demands were made for authoritative materials, dicta on what each offering would be like and how it should be used, guarantees that what would be undertaken would be more valuable than what existed. That such tendencies toward perfectionism did not dominate the enterprise will be clear from the descriptions in Part II of this report, but an experimental posture grew rather slowly.

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*Part I was drafted for the staff by L. D. Haskew.

Looking back, it is possible to identify a rough morphology of functions performed in the process of implementation. They were: initiating, defining and organizing, financing, providing the facilities, selecting and producing the offerings, readying for utilization, designing evaluation, utilizing the network and directing and re-directing the enterprise. It must be emphasized that no such logical structure preceded the implementation attempt. These headings are classifications after the facts, but should prove useful in generalizing from pilot experience.

Initiating. In this instance, initiation revolved chiefly around an idea generated by a few within one institution being sold to -- but bought on its merits, it is hoped -- by many others. Two individuals were in conference on a different matter; one had a brainstrom about something quite similar to what TEMP turned out to be (he really just put together several things he had heard about or read about); the other took the idea and, with the help of three colleagues, turned it into a prospectus which was modified and refined by the original two; then the prospectus was laid before two agencies who might be interested in backing it with funds, with encouraging results; at that stage, capitalizing upon personal friendships and previous working relationships, top administrators of other colleges were called in to look at the idea. The idea might have been rejected; in fact, if all had known what lay ahead odds are high that it would have been blessed but interred. It was not rejected but embraced. How much this outcome was due to the merit and appeal of the idea itself coupled with understanding commitment of the college administrators to it, and how much to the persuasiveness of the presenters along with previously developed confidence in The University of Texas, will never be known.

Three observations are pertinent here. First, this project, now properly labeled cooperative, did not originate from the classic hypothesis of a set of individuals (or institutions) drawn together by a common quandary perceiving the need for a solution, casting about for and exploring solutions, and finally generating by creative consensus a "solution" to which commitment is already guaranteed by manifestations of group dynamics. Does any such project ever originate thus? Certainly in this case the style of origination cast a long shadow toward the future. The project was imaged as "The University's baby" for a considerable time; group proprietorship was assumed slowly, but was finally developed to remarkable degree. The University of Texas received considerable *carte blanche* in policy as well as procedural matters and frequently moved on fundamental decisions without deliberative action by its partners. Accompanying this, however, there was a deliberate attempt by the executive agent to broaden proprietorship and concern. Undoubtedly, there were many instances when the partners had a quite legitimate reason to feel trodden upon and left out in spite of conscious efforts of The University of Texas to proceed on the basis of adequate consultation. That so few of the college heads now remember having had such feelings seems significant. Perhaps one summarized the administrative point of view when he said, "If it hadn't worked this way, I think we'd have no project at all; we'd still be trying to get started." In brief, the "promoter" style of initiation did contribute to the big desired result -- an operating network now rather completely viewed as a cooperative endeavor -- in an unprecedentedly short period of time. That this generalization is applicable beyond the pilot program is uncertain; it does constitute a derivation from TEMP's experience.

A second observation is that initiation was almost exclusively administrative; almost no involvement of the prospective users and consumers occurred until after the project was a live creature with outside commitments not easily changed. In The University of Texas the initiating impetus was even more narrowly restricted; no top academic officer was really involved beyond the stage of permissive blessing. The conditions arose to plague almost every step taken toward melding TEMP with the on-going academic enterprises in the subscribing institutions. The meld, even yet, is far from what proponents think could exist, but it is a meld. Much was done after initiation to transfer TEMP from administrative favor to faculty concern. Could this have been accomplished easier and more effectively prior to initiation? The pilot program cannot answer that question. It can aver that initiation by administration was only remotely tantamount to academic innovation.

A third observation is that the direction taken by initiation was decisively influenced by what outside agencies would be interested in financing. The original idea would have been discarded as idle dreaming, perhaps, had it been applied to the prospect of getting the institutions to find the money for any such undertaking. It is doubtful that the initial conception would have provoked even exploratory interest among college presidents if presented in a context of local financing. Further, the original idea itself was exuded through a sieve of hunches on what private foundations and government agencies would perceive as worth risk capital. From then on the idea went through several modifications -- although none of them were fundamentally reconstructive -- in response to outside interests. For example, in the first formulation of a prospective, almost exclusive emphasis was given to sharing by television rare and specialized course offerings; foundation interest, it was found, was much greater in utilizing a single instructor to reach large numbers of students. The design was modified accordingly but not to the extent of completely dropping the first emphasis. The generalization derived here is that intiation took place only because of the existence of agencies with risk-capital to invest in educational innovations and their existence and interests were prominent factors in the shape of initiation chosen by the initiators. But, in this project, initiation always remained with the investors and they were in the role of persuaders.

Now, whether a similar project with a lively case-example as referent can be initiated without outside assistance, TEMP's experience does not indicate. The TEMP promoters did hold out this possibility as justification for a pilot investment of innovative funds. Cost figures presented elsewhere in this report indicate that the outlays required for microwave interconnection and annual operation are hardly prohibitive when shown among 15 or more institutions. Participating institutions were investing larger amounts of money in 1963-64 than they were at the project's outset. That is as far as the experience of TEMP can go in predicting the future importance of outside money in initiating a project of this character.

Defining and organizing. Although described almost at the outset, this project did not get defined operationally until late in the first year of actual telecasting. The planners soon discovered that a great distance separated general intent from combined and implemented intention. For example, general intent was to provide instruction by "master" teachers, although every effort was made by the staff to avoid the use of what was generally considered an invidious term. This had to be defined, however, in terms of talent available, attitudes of professors toward being called a master or subjected to a master, the stakes which each college had in course contact and methodology, the expenses of having a course taped and ready to go on the air by a certain date. Intent transmuted into an operational definition encompassing these and similar practical ingredients. For another example, take the original intention "to offer courses." Over a period of months this became operationally defined as "present two lectures a week incorporating context which can be used in a course, provide outlines to instructors and materials which can be used by students, and leave the design and offering of the course to the individual college." Space forbids detailing the factors which influenced this definition. It, as many others, was arrived at as executive staff and various advisory groups and individuals faced the imperative of getting something on the air and using it. To generalize, operational definition emerged from the collision between an idealized description and the exigencies of a live situation. No predesigned perfect model could be imposed; only a vehicle with many imperfections was made operational but it had the one essential characteristic -- it did run.

Particular difficulty was encountered in defining this operationally and ideologically as an experiencing, finding, project. Even the executive staff at times became paralyzed by desire to choose the one alternative that would work perfectly. Advisory groups and directing councils often found it almost impossible to reach decisions because they wanted certainty and some reasonable guarantee that desired results would ensue. Consuming professors, administrators, and students persisted in judging TEMP as they would a textbook put out by some super-authority with promises that it would solve all the problems of learning and teaching. Actually, not until late in 1962-63 did the governing council of TEMP reach a firm decision with genuine commitment that this is an exploratory venture. One can speculate widely upon the sources of this typical reluctance by those in higher education to embrace uncertainty. In this instance, the organization and procedures for conducting the project may have been chiefly responsible. At any rate, we deduce from our experience that it is much easier to conceive an educational experiment than it is to produce an experimental attitude.

Organizing for conducting TEMP was no great problem. Maybe the style of organization produced some problems but it seemed to get down a rather gargantuan job, and on time. As one looks back, it appears highly fortunate that TEMP did not generate a constitution, by-laws, and an elaborate procedural protocol as its first artifact. There was a minimum of having to wait for one committee to decide before another committee could act to request a third committee to consider and adopt a policy under which an executive could proceed. Obviously, this state of affairs led to less of the standard formal cooperation and might have produced dissidence and eventual rebellion. It did not; evidence collected by the evaluators in 1962-63 indicated that the feeling of cooperation and loyalty among TEMP participants was high -- probably higher than in most conclaves of this kind. The organization did not permit, however, completely free exercise of authority by the executive staff. Almost every move had back of it the advice and enforcement of cognizant individuals or a group. The telling features were that this could be secured by direct, often informal, means and that a general rule of confidence in the good faith and competence of sub-groups and executives prevailed. Without doubt, existence of an executive complement of professionals who devoted extensive time, energy, and brainpower to this project accounted for much of the success of this style of organization. In summary, TEMP benefited considerably from a loose, improvised but basically guided organizational scheme, resting primarily upon assumptions of good faith in trying to get a job done with dispatch.

The greatest theoretical bugaboo in organizing TEMP failed to materialize. These disparate institutions, it was said, were going to find it terribly difficult to organize themselves into a coherent governing body for a common project which struck at the heart of their reason for existing -- teaching students. This was almost pure myth it turned out. Such disparities as religious affiliations, size, traditions, concept of mission and symbols of status were of moment, but offered no barriers to effective organization. The eleven heads of these institutions found no more difficulty in getting together on project objectives and plans than eleven heads of departments in a single institution. Disparate institutions can organize a project of this character.

Financing. The TEMP project is, even in 1963-64, still peripheral and incidental in the budgets of the participating institutions. The institutions have put significant sums of money into the project. Outright, they have purchased, installed, and maintained distribution equipment; they have made several operating payments to TEMP, some have made relatively heavy expenditures for videotape. Internally, they have absorbed salaries for TV instructors or their substitutes, expenses of production materials, a large amount of travel, and many kindred items. In addition, TEMP is operating only because faculty members, technicians and others (including owners and personnel of commercial television stations) have made non-reimbursed contributions whose purchase price would be tens of thousands of dollars. The financial support from outside grants, of course, really established the system and got it going but the institutions now have to keep it going. Their combined budgetary support -- both explicit and implicit -- is quite insufficient for this purpose. This project continues because The University of Texas considers its operation a justifiable and valuable undertaking of Radio/Television, a university division which is investigating and developing the applications of instructional television to the educative process. In brief, it would be misleading to deduce that TEMP experience indicates that a satisfactory system of this sort can be operated as it should be operated upon the budgeted amounts referred to in Chapter VII of Part II. The pilot project still confronts an unanswered question: will TEMP services eventually merit normal budgeting by the institutions participating?

The initial cost of TEMP was boosted far beyond that normal for collegiate ventures in instructional television by expenditures for production of the televised materials. By all odds, in the opinion of those who used TEMP, production money bought more per dollar than any other investment. Professors who could give full time to the exacting academic task of creating lectures and then to exploiting the television medium contrasted sharply in quality of output with men of equal academic ability who, in other situations, had been called upon to do the same job in off hours or as a substitute for classroom teaching of one course. Technical aspects of production also paid off when they were carried to high professional levels, even though this was expensive. The staff of TEMP knows from their own experience and that of others outside this project that ten "courses" can be put on videotape for one-third to one-half the expenditure made by TEMP. They would still choose the TEMP arrangement.

However, it is not at all certain that this heavy gross expenditure for televised offerings was necessary. It might have proved just as effective to use four or five high-quality "courses" recorded elsewhere and available on a rental basis. This possibility was considered. It was rejected because the governing council thought faculty and public acceptance of such offerings would be low and that TEMP should stick to the original theme of sharing between these institutions. Hindsight indicates that it would have been desirable, and perhaps not negative in impact, to try from the outset at least one or two already-recorded sets of material. In effect, it was indicated that the influential determinant of "outsideness" was the fact that the materials were not made by the individual instructor involved; the institutional origin seemed to receive little attention.

It seems to be an immutable law that the money available for equipment is always ten or more per cent less than is absolutely essential. This was certainly true for TEMP. Only the ingenuity of engineers and technicians, who proved often that baling wire is still electronic equipment and scavenging talent is more valuable than professional attainments -- got the system on the air at all, and only kindly Providence kept it there. Many of TEMP's most serious academic problems were traceable directly to a shoestring equipment budget. Equipment money is hard money to get from institutional budgets. It is passing strange that stimulative, venturesome granting agencies -- who must be aware of these facts of collegiate life -- tend to view hardware costs as off-limits. If the TEMP staff had it to do over again, there would be another $50, 000 to $60, 000 of equipment money or no project would be started. In essence, improvisational enthusiasm for ends to be achieved led to overstrain upon the financial structure -- an ever-present danger when projects are generated somewhat outside the rigorous fiscal control of an institution's regular program.

Providing the facilities. Reliance here was almost completely upon the staff of Radio/Television at The University of Texas. They soon discovered that the blithe assurances of speech-makers and authors that we were now in an era in which classrooms all over the world could be linked by microwave had not yet penetrated to the actual linkers. The Federal Communications Commission, the legal codes, the developed microwave technology and the equipment manufacturing industry had not yet transformed promise to practice. Some five engineers had model systems of linkage on paper, but none under construction. When TEMP appeared upon the scene as a concrete possibility, the effect was galvanic. The microwave system received attention and creative service from governmental agencies and from private enterprise which was remarkable. The story of the technical problems which were encountered and solved or surmounted, chiefly through the voluntary labors of private enterprisers, constitutes an impressive saga. The dreamed-of system did go on the air, on time, and this system has proved to be remarkably satisfactory from the technical standpoint. Improvements are appearing constantly; there is no hesitation in concluding that a network of this type is guaranteed fully satisfactory microwave linkage.

Across the board, facilities for TEMP are minimal. To fill in blank spots on the schedule with other offerings, for example, is a major problem in logistics, since video tape recorders are too few. More production in San Antonio, highly desirable, is almost impossible because the loaned commercial studios and equipment are already taxed beyond capacity. No standby microwave channel exists; auxiliary emergency power supplies are very scarce. What TEMP has shown is that this inter-college network can operate with shoestring facilities but that such operation has more crises in it than are good for well-ordered academic pursuits.

Reception and distribution facilities within the colleges were left to local contrivance. The majority of the colleges had no previous experience with such installations. The TEMP staff tried to give some technical assistance, but this had to be spotted. Some of the installations are quite adequate; all, with the exception of The University of Texas, are extremely limited in classroom coverage. A high proportion of the service interruptions occurring have been attributable to the local reception and distribution system operations. Although it is difficult to see where the necessary time and talent would have come from, the TEMP experience indicates that careful technical attention should be given to the selection, installation and training for operational maintenance of local reception-distribution systems.

Selecting and producing the offerings. In any project of this kind a tremendous amount of preliminary effort could go into selecting the offerings to be produced. Presumably, dividends would be realized in improved accuracy of selection and in increased readiness for what was finally selected. In TEMP, as has been shown, selection was foreshortened and made within a quite limited circle of participants. It was made chiefly by academic administrators; almost no involvement of institutional faculty bodies occurred, but considerable conferring between deans and department chairmen did transpire. Criteria of what audiences could be delivered and of readiness -- of -- assent loomed large. Also, the availability of a faculty member who wanted to try his or her wings in the new medium influenced selection sharply. Always in consciousness was the approaching deadline to be on the air. Whether selections would have been different if more "democratic" or more "scientific" procedures had been employed cannot be known. Consensus in 1963 seems to be that not more than three "mistakes" were made. Hence, it is deduced that executive decision based upon limited advice and small pools of judgment resulted in fair accuracy for selection of courses and instructors.

However, if selections could now be made anew after two years of experience, they could be based upon better information. Many administrative predictions of faculty response proved inaccurate, doubtless due to inadequate perceptions of what is involved in "accepting" a strange guest in one's own classroom, and also perhaps due to insufficient familiarity with the professional posture of members of a particular department. Also, one suspects that the choice-makers now have a different definition of what or who is "a natural for television." For example, one dean observed, "I knew Dr. __________ was a very popular and successful teacher; what I did not know was that he would not take any suggestions from a television producer or a visualization specialist." As another example, it was discovered that chemistry is not chemistry wherever you find it; Dean S. and Department Head T. thought they were selecting one thing; they got another and couldn't use it. Observations such as these lead to the conclusion that selections would have been more accurate if those selecting knew then what they know now. Fortunately, future selectors can know more since access to televised instruction in operation is now so readily available.

Methods employed in designing and producing the offerings have been described in Chapter III of Part II. TEMP was never charged to be a pilot project in producing televised materials for use in college courses in general. In this realm its objective was to equal or exceed the highest quality levels previously attained. However, this was a pilot project in producing courses for consumption by a fixed coterie of colleges, courses acceptable and usable on each campus. Two derivations from the attempt to do this deserve exposition.

The inter-college setting did cause some, but relatively few, significant modifications in course content. By and large, course content and structure as televised was essentially that which the instructor would have produced for use in his own classroom (or across the United States). However, preliminary discussion between faculty members and later planning or revision sessions did result in some shifts in about fity per cent of the courses. Very rarely were these related to what might be called commitments or philosophies of one or more colleges; predominantly, they originated in professional predilections for specific disciplinary outcomes or for one methodological rationale. Further, very few group-formulations tended toward provincialism; more tended in the opposite direction. In total, the impact of a pre-selected audience was of sufficient degree to be noteworthy in course-tailoring, but did not seem to call for drastic changes in usual procedures for course-design.

However, demand for adaptability of televised materials led to a semi-standard pattern. "TEMP is simply an agent of the individual colleges" it was bravely proclaimed, "and all it does is deliver materials which you can use in formulating a complete course." Implementation of this role took the form of providing lectures or other televised instruction to occupy two full periods of the class week, leaving a third period and/or laboratory sessions in the hands of the local instructors. Some variations from this pattern did occur, but it was the dominant one. Evaluative evidence indicates that this pattern did not lend itself in some instances to local adaptations or supplementations. Also, it made course-design perhaps too loose; the easy answer was always "well, the colleges can take care of that in their hour." Further, as a consequence, TEMP has nothing to report on the comparative value of complete course packages on one hand or once-a-week critical event presentations on the other hand. However, the single pattern appeared to be most desirable at the outset, and it was given a pilot run. It should not be necessary for any other system to replicate this experience.

Readying for utilization. Development of faculty and student readiness for innovations through TEMP offerings, it was decided, would be primarily an institutional obligation. Some meetings and conferences were held with inter-institutional groups, but these were devoted chiefly to design of the offerings, not to their utilization. Obviously, the executive staff of TEMP felt it totally inappropriate to approach an institution's faculty members on how to utilize what would appear, even if they had felt competent to consult in this academic area. Rather naively, it can be seen now, it was assumed that deans and department heads would be able to do whatever was necessary to supplement the undoubted disposition of every college faculty member to master any responsibility he assumes. In a significant number of colleges and divisions, something went awry. On activation day, the TEMP system was much more ready to provide instructional television than were faculty members and students ready to utilize it.

It must be remembered that the huried activation schedule of TEMP, the host of chiefly administrative and production problems, and the general style of activation made little provision for widespread faculty deliberation. Maybe injection of this would have developed more readiness, even if it had slowed down the project schedule. It must be remembered also that faculties in higher education are much less receptive and accustomed to the didactic approaches used in the common school system -- workshops, required meetings, demonstrations and other selling techniques. Perhaps some of these should have been tried. But there always remains the strong possibility that readiness to utilize really developed in widespread degree only after there is something to utilize.

Designing evaluation. Rather detailed provision was made for collecting a wide variety of evidence which could be used in evaluation; both diagnostic and goal-centered. Individually, the items of evidence are hardly mensurational and certainly not objectively definitive. In total, however, they have been logically convincing and quite helpful in reaching better-informed judgments. Part III of this report deals with the evaluative effort in detail. Especially important because this was a demonstration project and not a research endeavor, collection of evaluative evidence has interfered minimally with the major task of venturing with televised instruction by already-busy teachers. In our experience, *reasonable adequacy can be secured in evaluative evidence by careful antecedent design in a project of this character*.

Utilizing. Utilization turned out to be the greatest problem in implementation. That fact is hardly news in any report dealing with instructional television or any other similar packaged innovation intended for the college classroom. What unique aspects of the problem are attributed to the intercollege nature of this project must be our concern here. First, however, two facts should be pointed out. One fact is every time the chips were down the persons directly concerned with the utilization of TEMP offerings have voted decisively to continue them; further, written evaluations by instructors are for more supportive than the sometimes discouraging word brought back by staff visitors and furnished by administrators' reports on conversations. A second fact is that the utilization problem is bi-directional; the faculty member has as much problem in utilizing well what is put out as those who put it out have in getting it utilized constructively. Strengths and weaknesses are found in each direction.

The inter-college nature of TEMP does not seem to have introduced any new bafflements into the utilization problem. As one veteran instructor put it, "about all you fellows have learned is that eleven professors are eleven individuals wherever you find them." Comparing previous experiences with the introduction of televised instruction in a multi-professor course on a single campus with those had in TEMP, only one difference seems noteworthy. On a single campus, the pattern and strength of conformity-expectation is relatively (but not absolutely) uniform for all utilizers. With several colleges, the pattern varies from college to college. In a rationale of utilization-by-fiat, this difference might be significant, but in a rationale of voluntarism it is hardly distinctive.

The administrator origin of TEMP probably heightened the problem of utilization. In no sense does the evidence indicate faculty rebellion or reluctance generated by administrative initiative just because it was administrative. There were some early suspicions of a move which might throw faculty members out of work and other manifestations of the familiar fear-of-television syndrome, but again nothing unique to TEMP. What did transpire apparently was some failure in what may be called developmental communication between administrators and instructors. More importantly, a fundamental oversight in project design occurred; no specific provision was made to bring faculty opinion-formers into antecedent preparations for launching TEMP. Thus, the whole utilization problem did not really capture the attention of prospective users until they were confronted with a package deal which they had every right to assume was a finished product labeled "just heat and serve."

Without doubt, utilization was complicated by the partnership pattern for offerings. One impressive testimony to this generalization was the eagerness with which instructors from the college campuses responded to opportunities, provided well after TEMP started and continued with increasing favor, to come together and discuss the utilization, and modification, of an existing offering. The standard course pattern left much to the instructor, but he could not be sure what it was. Was he a discussion-assistant to the television professor, a quizmaster, a corrector of errors and omissions, a director of independent study, or what? This is not to imply that TEMP or even the officials in a given college, should have proclaimed answers to such questions; the point is that they complicated utilization. Further, one suspects that the materials produced did not take into account sufficiently the existence of partnership in the complete teaching process. In spite of complications, however, or maybe because of them, instructors were apparently stimulated to see effective utilization procedures and many were found.

The inter-college nature of TEMP seemed to accelerate development of constructive utilization. Unfortunately, there is no benchmark against which to test this generalization. But, it did appear that the existence of a combined focused attention upon problems of utilization. For one thing, there were people traveling around asking questions. There was an Academic Coordinator who seemed to spark activity when he made a call. There were formal and informal conclaves with administrative sanction, probably more than would have transpired on any single campus. There was interchange of ideas and recipes. All of these continue, and along with them there is perhaps more administrator-awareness that utilization is an important concern than could possibly have developed without the interchanges consequent upon cooperative evaluation and re-evaluation of TEMP.

Directing and re-directing. Already clear is the fact that the directions (or objectives) for TEMP are evolving phenomena. This is due in part to a central structure which gives wide latitude to a professional staff and rather quick output in response to a new idea input. The ponderous channels for change prevalent in many cooperative enterprises have not yet been adopted for TEMP. At the same time, however, there has been a growing degree of proprietorship and direction-setting exercised by the governing council. The new tryouts chosen for 1963-64, for example, were almost entirely the product of council thinking. But, the implementation of them remains a staff obligation -- and implementation involves finding the money, enlisting cooperative planning, devising offerings suitable for testing the ideas advanced, and many other actions hardly routine in nature. In TEMP specialized professional interest and competence have been strategic in making cooperation work.

B. Desirability

The source for pilot derivations now shifts to the experiences which shed some light upon the assumption that an inter-college network for instructional television should be a good thing.

Prime question, of course, is whether the availability of TEMP tended to improve the instructional program of the participating colleges. Here we deal with no theoretical possibility but with a tangible, artifactual application. That is, we have only the TEMP offerings to go by; what another set of offerings could produce is beside the point. However, it must be borne in mind that the design and execution of TEMP offerings drew upon about as much talent, prowess, money, and consultative assistance as any such enterprise is likely to command in the near future. Their imperfections and inadequacies resulted from the same processes which would be employed in other production enterprises; the mistakes were perhaps unique to this setting but mistakenness is hardly restricted to a collegiate constellation in Central Texas. In other words, there is strong likelihood that we are testing a typical product.

One improvement in instructional programs is to introduce more effective presentation. Is television presentation, per se, an improvement? The evidence collected in this project leads to the same conclusion reached in numerous other investigations -- in total, television presentation is as good as the live presentations with which students and faculties are familiar. Presentations in a few offerings were judged, by opinion and by test results, to be "some better"; in a few others, "some poorer." Considerable variation in the evaluation of individual offerings occurred from campus to campus. And, the plain fact is that student attitude toward receiving instruction by television tends to be slightly negative. This appears to result largely from comparison with the student image of an "ideal" live instructor. A detailed examination of this problem is found in Part III of this report. When we look at the total picture, in other words, it replicates in remarkable degrees the pictures typically emerging from college campuses across the nation where instructional television is in early stages of introduction.

But, the total picture may be misleading. Three TEMP offerings dealing with familiar courses were judged to be making significant and "new" contributions in presentation. In each case, methodology employed was mentioned prominently; subject-matter competence of the instructor also seemed unusual to recipients; "unique apprach" was a favorable factor denominated. Some administrators cited these presentations as "something we could not do on our campus with the faculty members available." Several instructors testified that "his approach has made me re-study the subject and change my own teaching." Thus, it seems clear that TEMP offerings did result in some improvements in presentation.

Another type of improvement in instructional programs is the addition of unusually renowned and scholarly members to the faculty rosters. TEMP found that it was very difficult to do this. "Renown" accorded on our campus or certified to by one administrator seems to dissipate during the move to another campus. In fact, dealing as it did chiefly with introductory courses, TEMP found it difficult to enlist professors of international stature; it did enlist several who deserved renown because of their effective teaching performances but they had to earn such reputation on each campus -- they could not carry it with them. TEMP did offer one historian of national eminence who was almost a legendary hero in Texas; professors and administrators enthused over his availability. Students, however, did not respond; departments of history at the various colleges seemed untouched by his influence.

A third improvement in instructional programs consists of providing specialized, useful courses not within the resources of the college. TEMP did, relatively, a good bit of this. What was considered its prime specimen -- an advanced course in history -- did not work out well in spite of eager initial acceptance. Others, however, did work out well and were counted generally as notable additions. Cost-per-student for this kind of offering was relatively high, but not out of proportion to cost differentials prevailing for such courses offered in person at a single institution. This type of program improvement is feasible, in TEMP's experience.

A fourth improvement results from the introduction of stimulating norms -- in teaching performance, in subject-matter composition, in performances expected of students, and so on. We have only the most informal evidence on this point. Administrators and visitors from the TEMP staff thought that there were noticeable feed-outs from the televised materials in these directions. The staff was of the opinion that utilization conferences and other faculty conclaves produced results of this character. However, although there were some administrators who thought that this type of impact was perhaps the outcome most to be sought from inter-college television, the professional staff never hinted either in contacts with faculty or in evaluative instruments that TEMP had any such objective. They were having enough trouble with faculty acceptance as it was.

Obviously, other improvements in instructional programs might have been attempted through TEMP offerings. Case-study materials for independent use by students should prove valuable. Practice sessions, in a foreign language or in speech for example, could be provided. Course-enrichment opportunities seem naturals for an inter-college network. These are only a few illustrations of opportunities for instructional program improvement which TEMP must report sadly that it has not yet given a pilot run.

A second question pertinent to desirability is cost. Obviously, evaluation of cost can be made only in terms of what outcomes are being produced and the relative value of those outcomes. This report, however, must shun the temptation to get into these matters. A two-year pilot run is not sufficient basis for speaking definitively on them. However, it has been sufficient to throw some light on the magnitude of cost and the factors affecting that cost.

Each TEMP course represents the investment of approximately one-and-a-half years of the professional life of a faculty member -- one year for original production and approximately 25 per cent time in each of two years on revision and enrichment and production of accompanying student materials. How long this latter process will be necessary we do not know; experience thus far affords little comfort to those who hold the thesis that a videotape has the life-expectancy of a textbook without change. To this investment of talent must be added the equivalent of the full time of one professional television specialist per original offering. Televised instruction, in brief, consumes a large amount of human-talent-life.

Intricate cost accounting, full of arbitrary decisions and hemmed in by all sorts of contingent considerations, is necessary to arrive at the annual dollar cost-per-offering on the TEMP network. By manipulating the assumptions, one can arrive at almost any figure desired. But, for a single figure which will approximate the annual dollar investment in each offering of a 15-course network the size of TEMP, we can offer with some confidence the amount of $18,000. Remove the costs of equipment, its depreciation, and its modernization, and the figure becomes $14,000. This latter figure corresponds to the "current-costs-per-course" familiar in institutional studies of the costs of live instruction. Share it between ten institutions and the resultant figure is quite encouraging to those who seek economy. Again, as a generalization with all sorts of escape clauses, the TEMP experience indicates that inter-college networking is potentially desirable from a financial standpoint.

A third question, and the final one to be raised in this report tests desirability from the manpower angle. Does TEMP-type networking of televised instruction result in more effective deployment of faculty resources in the participating institutions? The TEMP answer has to be a qualified "no." If the potential exists it was not realized in the first two years of operation.

It was thought that institutions would be able to capitalize upon televised offerings in at least three ways. First, by using television in multi-section courses two hours per week, one instructor could conduct the "local hours" and the other instructors could undertake other assignments. Few of the colleges involved face multi-section situations. In those which do, the almost universal practice is for each instructor to sit with his section while television is received and then conduct the local hour. Such presence by the instructor is typically voluntary -- he is not required by administrative wish to be present -- but instructors with few exceptions have apparently been loath to desert the classrooms for which they feel responsible.

A second type of re-deployment was thought to be particularly promising for the smaller college. Theoretically, a history instructor formerly almost completely loaded with the required introductory course in "American History," for example, would now have the opportunity to develop at least one advanced offering and thus strengthen the departmental major in history. This has not yet occurred. Most instructors still say that the "relief" from the televised course is imaginary; it is not classroom appearance which is energy consuming, but all those student conferences, papers, tests, and reading lists for which the instructor is still responsible.

In only one or two cases, however, has real re-deployment taken place. In one a history instructor who was also student counselor, reported that the relief from four hours a week (two of preparation, two of delivery) enabled him to do a far better job of student counselling. In another case, a history instructor declared that TV made possible the completion of his work on his doctorate at another institution.

These instances indicate that where real incentive exists re-deployment is possible. Developing incentives is as yet an unsolved problem in the majority of cases.

The third type of re-deployment envisioned was in scholarly specialization. Freed from the preparation of two lectures a week, an instructor would devote that time and effort to the preparation of the third session which would reflect now the results of his own specialized inquiry or interpretation. Some of this may have occurred without showing up in the evidence collected. Evidence from instructors, however, is that they believe it takes more time to plan utilization and drill upon and corrections of the televised material than was formerly used to conduct the class sessions themselves.

However, in one case of the TV course, "Introduction to Psychology," an instructor well-prepared for the teaching of a course in educational psychology, found himself faced with the necessity of teaching psychology as well, because the designated instructor had been called into military service. Television enabled him to manage the increased load.

One of the emphases in 1963-64 plans for TEMP is renewed exploration by administrator-faculty conclaves of the possibilities in re-deployment and husbanding of faculty resources. Perhaps some of the potentials will prove to be real ones. It is the conviction of TEMP staff members and some others that what is faced here is a problem in attitude-changing, a slow and difficult process.

The Future of TEMP

Permanence, as we have noted, was an objective of TEMP. It has come a long way toward that goal as the succeeding chapters will show. Expansion was not an objective *per se* but is, as in all such projects, the healthiest indication of permanence and perhaps the best proof of genuine value and viability. Such a development is envisioned; one additional nearby institution will join TEMP in 1963-64, others more distant are actively exploring that possibility. A substantial expansion of the system to include more distant institutions poses considerable financial problems; it would also create new difficulties in coordination and system management. On the other hand, it is clear to the staff of TEMP that enormous strenthening of the project economically and programmatically would also ensue, and there is a feeling of genuine optimism regarding such a development.

In Conclusion

This report seeks no gilding of a lily. Those who wrote it think that no artificial enhancement of TEMP is necessary. It has done what it started out to do, namely, establish and actually operate an inter-college network for capitalizing upon the potentials in cooperative collegiate endeavor through television. It also started out, and continues, as an effort to explore and report upon an educational innovation. To the best of our ability, we have reported what has been transpired and what has been found out.

PART II

DEVELOPMENT AND OPERATION

CHAPTER I

THE TEMP STORY

It was 7:00 a.m., Monday, September 18, 1961. The engineering staff had been working around the clock for the past twenty-four hours as final adjustments and alignments for the one-hundred-mile-long microwave network were still being made. In one hour and three minutes the first lecture, "Modern Mathematics," was due to be fed into fourteen classrooms representing eight different Central Texas colleges. By 7:45 a.m. the video tape containing Dr. James Gray's opening math lecture had been "cued up" on the VTR machine awaiting the 8:03 playback time. At 7:50, the microwave system experienced its first breakdown: a blown fuse at the main transmitter site on the twenty-fifth floor of The University of Texas' Main Building. But the 599 freshman mathematics students who were then filing into their widely separated classrooms were unaware of the momentary failure because repairs were made in time for them to miss nothing of Dr. Gray's first lecture.

As the day progressed and other TV lectures filled the screens, the administrative and engineering staff of the Texas Educational Microwave Project -- TEMP -- were able to relax and contemplate the events which had transpired since initial planning began on the project in 1957.

Historically, the ideas that came to realization in TEMP derived from a number of sources and were closely related to other developments in educational television. Primary among these was the Central Texas effort in educational broadcasting as opposed to closed-circuit instructional television.

Under the Federal Communication Commission's Table of Allocations for Educational Television, Channel 9 had been set aside for San Antonio, Texas, while a UHF channel had been allocated to Austin.

Interested parties in both of these Central Texas cities recognized that the VHF facility, Channel 9, could well serve both localities if the transmitting tower could be situated approximately midway between the two cities. FCC permission was given. The problem then arose of delivering the broadcast signal from production studios in either Austin or San Antonio to the proposed transmitter site some thirty-five miles midway between each city. Microwave transmission emerged as the logical solution.

As engineering studies progressed for this microwave link, it became obvious that more could be gained than just a technical connection for a broadcast operation. By extending the microwave link thirty miles north of Austin to Georgetown and by adding a twenty-mile spur to Seguin, eleven Central Texas institutions of higher education could have their classrooms interconnected for instructional television purposes. The colleges involved were:

Southwestern University	Georgetown
The University of Texas	Austin
Huston-Tillotson	Austin
St. Edward's University	Austin
Southwest Texas State College	San Marcos
Texas Lutheran College	Seguin

Incarnate Word College	San Antonio
Trinity University	San Antonio
San Antonio College	San Antonio
Our Lady of the Lake	San Antonio
St. Mary's University	San Antonio

These eleven schools were to be physically linked by microwave transmission. Instructional material previously recorded on video tape could be fed into the system either from The University of Texas' television studios in Austin, or from three of the commercial television stations in San Antonio. Live programming would also be possible.

Through the formation of this electronic campus, the faculty resources of all eleven schools could be shared. This concept of the sharing of faculty resources within the confines of the TEMP organization became the programming basis upon which the project was developed. Thus a proposed transmission link for one educational television project became a separate project in its own right with its own attributes, problems, and advantages.

The immediate problems facing the system planners were in the areas of engineering, FCC permission, and funding. Although the problem areas could be separated for discussion, their solutions were sought concurrently under the direction of Robert F. Schenkkan, Director of Radio/Television, The University of Texas, and his immediate superior, Dr. L. D. Haskew, then Vice-President for Developmental Services of The University. Engineering details were supervised by N. W. Willett, Chief Engineer for Radio/Television, who was given assistance by the consulting firm of A. Earl Cullum of Dallas, Texas

Before progressing with the TEMP story as such, we should pause to point out that the original group striving to activate Channel 9 counted among its members the presidents of many of the colleges later to be affiliated with the microwave network. Consequently, while these men's initial efforts had been directed solely toward a broadcast facility, they were from the beginning a part of the TEMP effort and were instrumental in planning with The University of Texas staff for the project. Without their cooperation, the system could not have become a reality. Since The University of Texas was the only one of the eleven schools with either television production equipment or experience in the production of instructional television programs, leadership in the development of the system fell to the office of the Director of Radio/Television, The University of Texas, and this leadership included, among other things, finding the funds for the system.

Because of its extensive activities in support of educational television, one of the first sources of funds considered was The Ford Foundation. The Foundation was not in a position to provide capital outlay, but Dr. Alvin C. Eurich of The Ford Foundation did, in late 1957, express interest in the programming aspects of the proposal. Such money would be needed, but first, it was necessary to have money for the electronic system.

Initially, it was not even known how much the microwave network would cost, because it had no predecessor. In this respect, engineering and financing efforts were closely allied in that technical specifications were necessary so that construction bids could be made, and these bids were necessary in order to know how much money to request. By early 1958, the engineering staff had been able to provide a preliminary engineering proposal which served as a basis for bids on system installation and shortly thereafter RCA entered a bid of $235, 375 excluding the wiring of individual classrooms. Soon, enough other manufacturers had submitted estimates to permit the drafting of a proposal based on a reasonable average of cost estimates.

Also during the early months of 1958, The Ford Foundation suggested that a request be made to The Foundation for the support of the programming of the system provided other funds could be found for construction. The source of such funds seemed to appear with the passage of the National Defense Education Act of 1958. Title VII of this act permitted either the leasing or purchase of equipment for experimentation and demonstration work in instructional television.

On October 16, 1958, a preliminary proposal was submitted to the Department of Health, Education, and Welfare, United States Office of Education, requesting support under Title VII of the National Defense Education Act. This proposal requested $57, 377 per year for three years or a total of $172, 131. The money was to be used for leasing transmission, receiving, and associated equipment only. All other equipment and all operating costs were to be provided by the participating colleges with program support from The Ford Foundation. In the light of experience the $172, 131 requested seems small indeed, but in 1958 experience upon which to base a more realistic figure was not to be had.

The proposal was the first to be received by the United States Office of Education as a grant-in-aid request under Title VII. The Office replied that they were "intrigued by the originality of the proposal," but it was requested that further study be made toward a more definite proposal along with the suggestion that application be made for a contract rather than for a grant-in-aid. During the following year, from mid 1958 to mid 1959, detailed studies of microwave relay tower locations and other engineering considerations permitted refinements in the cost estimates of the physical system.

All the planning that had transpired to date (1959) had taken place with the full knowledge that the system could never be a reality without a rule change by the Federal Communications Commission. But the point was made by engineering companies that the proposed microwave link might well stimulate a definition by the FCC concerning educational usage of microwave frequencies. The frequencies required were, in 1959, reserved for Business Services Radio or other non-educational utilization. It was also pointed out that in addition to clarifying the question for educational use, a Commission decision would also encourage manufacturers to design and build equipment to suit education's specific needs.

Before resubmitting the proposal to the U. S. Office of Education, the administrative heads of the eleven participating colleges worked out a schedule of payments to be made by each school designed to defray, at least in part, the major operating costs. The University of Texas pledged $30,000, and the other ten institutions each pledged $5,500 payable over a period of three years.

The numerous meetings and conferences which marked the first six months of 1959 resulted in the final wording of a proposal to the U. S. Office of Education. The proposal called for a contract to conduct a three-phased demonstration in the use of closed-circuit television to effect a sharing of faculty resources among eleven institutions of higher learning in the Central Texas area. The three phases were as follows:

> Phase I -- July 1, 1959, to November 31, 1960. Delineation of specific objectives, selection of a national advisory committee, and development of the FCC application and its attendant construction permit. Begin production of courses.
>
> Phase II -- December 1, 1960, to August 31, 1961. Construction and operation of system on a pilot, three-campus basis. Continue production of courses.
>
> Phase III -- September 1, 1961, to August 31, 1962. System in full operation with research activities carried out by the Project Research Director.

Phase I

July 1, 1959, marked the official beginning of Phase I. On August 28, The Ford Foundation granted $7,200 in support of the position of the Academic Coordinator, which was held by Mr. Eugene Nelson. This sum was to cover salary, travel, and minor expenses for a one-fourth time appointment during the 1959-60 school year and full time during the summer of 1960. On October 21, 1960, the FCC performed a rule-changing action which made frequencies available for the first time for an educational microwave system. But this rule change was for TEMP's pilot operation only. However, later FCC action cleared the way for the licensing of the full system with the use of frequencies in the 12 kmc band for intercity transmissions and frequencies in the 6 kmc band for use between urban areas. Since then the Commission has ruled that utilization of these frequencies for additional systems will be granted only on a case-by-case basis.

Phase I also witnessed an agreement by The Ford Foundation to pay the full-time teaching salaries of those instructors selected to go before the cameras with their instructional materials. It was the prime responsibility of the Academic Coordinator to see that the television instructors were well selected. Two were chosen from San Antonio College, Drs. David Trimble and Marjorie Walthall; one from St. Mary's University, Dr. James Gray; one from Southwest Texas State College, Dr. R. T. Gary; and four from The University of Texas, Drs. L. O Morgan, Walter Prescott Webb, LeRoy Shaw, and Fillmore Sanford. The content of the eight courses selected could be divided into two broad groupings: those courses found in the catalogs of all eleven institutions, and then those courses unique to one or only a few campuses which the system could now make available to all. The courses in "American History" and "Modern Mathematics" serve as examples of group one, while Dr. Webb's "Great Plains" and Dr. Gary's "Science for Elementary Teachers" exemplify selections from group two.

Another objective of Phase I was the formation of a national advisory committee whose function was to assist the system planners in the formulation of objectives and in the manner of carrying out these objectives. The names of the men who comprised this committee are listed in the Appendix.

Since all of the major activities of Phase I have separate chapters of this report devoted to them, it is sufficient at this point to indicate that all of the objectives of the initial phase of the project had been met by November 31, 1960.

However, up to this point in time, TEMP as a name or title did not exist. The project's official title as carried on the contract with HEW was "A Field Study in the Wider Use, by Means of Microwave Television, of Faculty Resources Among a Number of Institutions of Higher Education." In early December, 1960, the more manageable working title of TEMP -- Texas Educational Microwave Project -- was adopted.

Phase II -- The Pilot Project

As Phase II got underway, Dr. R. C. Norris rejoined the project staff following a year's leave of absence and assumed the duties of Project Coordinator. Since the position of Academic Coordinator had expired with the close of Phase I, the Project Coordinator carried on the supervision of academic coordination.

Activity centered around the planning and production of the eight televised courses selected during Phase I. Since the Pilot Operation which was to include the three Austin schools (Huston-Tillotson, St. Edward's, and The University of Texas) called for two courses, these two were given production priority. The courses were "Introduction to Psychology" by Dr. Fillmore

Sanford and " Great Plains" by Dr. Walter Prescott Webb. However, while the aforementioned two courses were given production preference, efforts were not slowed down noticeably on the preparation of the remaining six offerings.

The approach to the production of the majority of the courses offered on TEMP was goverened generally by the idea that if the course could not be utilized effectively in the classroom it was pointless to produce it.

It might be helpful to offer here a brief summary of those activities surrounding the production of "Science for Elementary Teachers" as taught by Dr. R. T. Gary of Southwest Texas State College. The course was designed to instruct education majors in basic science while also illustrating for them methods of teaching science in the primary grades. Dr. Gary's first step was to visit all of those participating colleges which would be utilizing the course. The course would not be feasible for all eleven colleges, because not all of them offered teacher preparation courses. The purpose of Dr. Gary's trips was to see at first hand what laboratory facilities were available and to talk individually with the teachers who would be utilizing the course in the classroom.

There then followed a series of meetings which dealt with the problems of textbook selection, course outline, teachers' manual, and student handbook. These meetings were attended by the teachers who would be utilizing the course in the classroom. At this juncture it would be well to point out that "Science for Elementary Teachers" was designed for two 45-minute television presentations each week with the third class hour being given over entirely to each local instructor. These meetings were also attended by the television producer so that he would be as aware as possible of the classroom teachers' problems and desires.

The next happening in the chain of events was the actual production of the course. From the beginning of the project the desirability of using video tape had been emphasized for several reasons. Chief among these were picture and sound quality as opposed to that obtained through kinescope recording; lower cost as compared with the regular motion picture process; the possibility of immediate playback so that the television instructor could check immediately for errors in content; and the possibility of erasure and reuse of the tape stock in case a teaching series should be discontinued. The production advantages of recording the lectures rather than giving them live each time are also obvious.

It was not unusual following the taping of a given lecture for the classroom teachers who were to utilize the course to come together in Austin to preview Dr. Gary's efforts. This procedure served the dual purpose of guiding the studio instructor in effective television teaching techniques and in preparing the classroom teachers for the time when they would be using the course.

Two courses were notable in not following the foregoing procedure: "The Great Plains" and the later production of "Introduction to the Visual Arts." In neither of these courses were consultations carried out with the classroom teachers. Either because of this or for a combination of other reasons both of these courses have consistently experienced low utilization.

It was recognized early in Phase II that one of the most consistent problems facing TEMP was that of systemwide communication. With the best of intentions, misunderstandings arose within schools and between schools and the central administration because of faculty communication . . . either the lack of frequent communication or because of the use of an unfamiliar vocabulary, or both. Despite (or because of) the fact the same men were generally both administrative heads of the TEMP participating colleges and members of the Channel 9 broadcast board, many of them had difficulty distinguishing between Channel 9, a broadcast facility, and the microwave project which was to be strictly closed circuit. This confusion was greatly eased through the publication of a glossary along with a regularly issued newsletter[1] and through frequent visits by members of the central administration staff.

The microwave transmission equipment for conducting the pilot program was leased from the Collins Radio Corporation in early 1961 following competitive bids, and on January 18 the FCC approved the construction permit. February 6, 1961, saw the first day of telecasting on the three-campus pilot network.

The first semester of teaching by microwave transmission offered two courses: "The Great Plains" and "Introduction to Psychology." Student enrollment totaled 248, with 143 from The University of Texas, 46 from Huston-Tillotson, and 59 from St. Edward's University.

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[1] See Appendix for examples.

The actual operation of the pilot system encountered few equipment difficulties. Those incidents which did occur were minor in nature and were as much the fault of human error as mechanical. At one time a receiver was switched to the wrong channel; at another the power to the distribution system was turned off by a janitor without the knowledge of the classroom instructor.

Reactions to the pilot operation were generally very favorable from the classroom teachers, students, and visitors who participated in or observed the presentations. Letters received from the classroom teachers made several suggestions for improvements in production, such as leaving some visual material on the screen for longer periods of time to facilitate note taking. Events such as wrong channel selection and using both contrast control and the off-on switch to turn the receiver off (resulting in no picture the next time a teacher tried to use the set) provided the staff with some indication of the minor frustrations which might be anticipated and perhaps avoided by prior planning when the entire eleven-campus system went into operation.

As a matter of fact, an attempt was made to contact personally every classroom teacher who would be utilizing TEMP courses and to instruct him in such elementary things as how to turn a TV set on and off. Unfortunately, some of the classroom teachers were not appointed by their respective schools until one or two days before full system operation began in September, 1961.

Preparations for total system operation were by no means curtailed during the pilot operation; in fact, they were intensified.

The bell schedules of the eleven participating institutions were not uniform, nor did they all follow the same vacation and first day of class schedules. Some schools observed a class hour that began ten minutes before the hour, some on the hour, some began ten minutes past the hour, and one college began classes on the half-hour. There was a fifteen-day spread for the beginning day of the fall semester among the colleges. At the same time, not all of them observed Thanksgiving on the same Thursday. There was variance in both the Christmas holidays and in the beginning of final examinations. Something had to give, and it did. The solution was found because of one thing: institutional cooperation.

The Dean of Faculties of one of the colleges stated in a meeting addressing itself to the problem that each school could continue as it had in the past and thus forget the TEMP experiment, or everyone could agree on a common schedule and let the project get underway. Following this statement, the decision was reached for all schools to begin classes on the hour, and to observe the same Thanksgiving. Since catalogs had already been published announcing the first day of classes, it was necessary to delay all telecasts until every college had classes in session and to complete all television instruction before the first scheduled final examination took place.

Decisions concerning the hours of presentation of the various TEMP courses were worked out during the spring semester of 1961. "Modern Mathematics" (College Algebra) and "College Chemistry" as freshman courses were assigned the eight a.m. hour. Since 10 a.m. Monday, Wednesday, and Friday is probably the most popular class hour on any campus and because

"American History" was a required course on all eleven TEMP campuses, this course was given this popular hour. However, even this choice time was not universally acceptable: the church-related Huston-Tillotson College has never been able to utilize the "American History" offering by TEMP because of a campus-wide convocation traditionally held each Wednesday morning. When reading the following schedule of course offerings, it should be kept in mind that except for "The Great Plains," TEMP courses are composed of two television lectures and one local classroom session per week. For Tuesday-Thursday classes the normal pattern has been for each classroom teacher to hold a 30-minute discussion period immediately following the television presentation. This was caused by the policy of most colleges in not offering classes on Saturdays.

FALL SEMESTER

SEPTEMBER, 1961

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
8-9	Mathematics (College Algebra)	College Chemistry	Mathematics (College Algebra)	College Chemistry	
9-10	Science for Elementary Teachers	Focus on German Sec. III	Science for Elementary Teachers	Focus on German Sec. III	
10-11	American History		American History		
11-12	Introduction to Psychology	Music Appreciation	Introduction to Psychology	Music Appreciation	
12-1	Great Plains Sec. I		Great Plains Sec. I		Great Plains Sec. I
1-2	Focus on German Sec. I		Focus on German Sec. I		
2-3	College Chemistry Sec. II	Focus on German Sec. II	College Chemistry Sec. II	Focus on German Sec. II	
3-4	Great Plains Sec. II		Great Plains Sec. II	Great Plains Sec. II	

The preceding, then, comprises an overview of academic progress made concurrent with the televising of the two instructional courses during the three-campus pilot project. Engineering progress was also being carried forward in preparation for the eleven-campus network which was to be activated the coming September.

Original engineering thought had centered around the development of a heterodyne system, but the decision was later made to employ a non-heterodyne system because of cost estimates and the lack of manufacturer's experience in this type of equipment. However, it should also be pointed out that experience was not widespread in either type. Opening date for the bids to cover the main system was set by the Texas State Board of Control for March 31, 1961. Only three bids were received by bid opening time, and evaluation of the bids made independently by both the Cullum consulting firm and by the TEMP engineering staff concurred in the selection of Collins. A more detailed account of this bid-letting aspect of the project can be found in the Appendix under "Technical Reports." In summary, Collins Radio was awarded the contract to develop and install the physical system and construction took place concurrently with Phase I; so that the system would be fully operable by the middle of September, 1961.

During the summer of 1961, the Project Coordinator visited each participating institution with the express purpose of discussing classroom utilization with those faculty members who would be the TEMP classroom teachers. It developed, however, that much of the time spent with these classroom teachers had to be devoted to dispelling fears of technological unemployment, assuring them that local autonomy would be maintained, and continuing to point out that television as employed by TEMP represented an attempt at improving college instruction through the cooperation of the classroom teacher. It was obvious in the course of these visitations that some faculties were better prepared than others for the advent of instructional television on their campuses. On the other hand, it was equally obvious that on those campuses in which the administration, after making the initial decision to use TEMP, had counseled with its faculty and had done a thorough job of faculty preparation, there were few if any faculty objections to instructional television.

Phase II ended on August 31, 1961. The three-campus pilot project was considered in all respects to have been successful. Student response at Huston-Tillotson College, at St. Edward's University, and at The University of Texas was encouraging, as was faculty reaction. A shortage of time was probably the biggest problem; because in retrospect we now feel that it would have been advantageous for the full system to have been operable during the summer, so that faculty members could have previewed fall course offerings during the summer. This is despite the fact that many of the faculty members of the participating colleges were instrumental in planning the courses. The point remains that they could have undoubtedly done a better job of utilizing some of the courses in their respective classrooms had they been able to preview more of the video taped lectures and demonstrations. A fair number of classroom teachers saw a given presentation for the first time with their students.

Nevertheless, TEMP was committed to a deadline; and it is possible that delay would have lessened enthusiasm which gave evidence of increasing as Phase III began.

Phase III

September 1, 1961, marked two things: the beginning of Phase III, full system operation, and the fact that the first day of TEMP classes was only slightly more than two weeks away. The physical system was not complete, but completion was in sight. The playback schedule of courses had been published several months earlier. Production of courses for the first semester was far enough along for there to be no doubt of completion by the time the end of the semester arrived.

One day before the first scheduled day of televised classes, installation engineers from Collins Radio, along with TEMP's own staff engineers, were still making final technical adjustments as described in the opening of this chapter. They completed their work on time.

"Modern Mathematics," taught by Dr. James Gray of St. Mary's University, San Antonio, was the first course offering coming at 8:00 a.m., Monday, September 18, 1961. The video tape on which Dr. Gray's lectures had been recorded was played into the system from the San Antonio commercial television station KONO.

It was deemed advisable to use the facilities of San Antonio commercial stations in order to lessen the load on the limited playback equipment at The University of Texas.

At 9:00 a.m., "Science for Elementary Teachers" was shown from a VTR machine on The University of Texas campus; and at 10:00 a.m., WOAI-TV joined the network with Dr. Trimble's "American History" course, and so on throughout the day.

Throughout the fall semester of 1961 meetings of the classroom teachers utilizing TEMP courses were held. As a result of the meeting of the mathematics instructors, it was decided to change the format of the TV course the second semester. The first semester which addressed itself to teaching algebra followed the usual TEMP format of two 45-minute TV lectures per week and one open hour for local, live discussion. The math instructors were in accord in wanting more time following each TV presentation for classroom questions. Consequently, production for the second semester was adjusted to three 30-minute TV lectures per week with the additional provision of no television every other Friday (on a Monday-Wednesday-Friday schedule).

At this juncture, it may be well to repeat that the decision to use instructional television had been made at each participating college by a top administrative official. The classroom teacher tended to come into the picture later. How to use instructional television was then left to the classroom teacher. As pointed out before, some faculties were aided by their administration in the question of how best to utilize TEMP, some not. A real effort was made by the TEMP staff to assist in the area of utilization but not in all cases was it known who the classroom instructors would be until it was too late to give adequate orientation. As a consequence, the content area meetings served the very useful purpose of letting somewhat frustrated instructors profit by the experience of colleagues who had enjoyed success in their utilization of the various TEMP offerings.

"American History" also underwent some production changes following meetings devoted to evaluating this course. These changes resulted in a slight reduction of the total number of TV lectures and a complete re-recording of eight of the original lectures in order to introduce more visual material.

On the whole, however, the classroom teachers were pleased with the courses as originally produced.

The following enrollment chart gives the student enrollment for the TEMP courses at the various participating colleges for the fall semester of the first year.

TEMP Fall, 1961	U. T.	St. Ed.	H.-T.	SW	S.W.T.S.C.	T.L.C.	S.A.C.	Trin. U.	St. Mary's	Inc. Wd.	O.L.O.L.	Total
AMERICAN HISTORY	225	40	0	0	63	52	90	0	59	75	52	656
COLLEGE CHEMISTRY	627	70	0	36	51	95	131	0	61	104	25	1200
FOCUS ON GERMAN	261	21	0	41	14	0	65	0	63	14	15	494
INTRO. TO PSY.	127	35	11	27	88	40	94	0	43	0	18	483
VISUAL ARTS	X	X	X	X	X	X	X	X	X	X	X	0
MODERN MATH.	94	40	23	35	0	0	104	0	110	143	50	599
MUSIC APPRECIATION	0	10	14	0	45	0	38	0	0	75	6	188
SCIENCE FOR ELEM. TEACHERS	0	0	9	28	55	0	0	0	0	56	0	148
THE GREAT PLAINS	26	0	0	16	18	15	0	17	0	15	10	117
Total	1360	216	57	183	334	202	522	17	336	482	176	3885

During the academic year 1961-62, the Project Research Director, Dr. Fillmore Sanford, carried out extensive investigation concerning student and faculty attitudes toward the project. These findings are given in a separate chapter.

As Phase III ended, the U. S. Office of Education had contributed a total of $344,812 which was followed by a supplementary grant of $25,000 for the second full year of system operation. The Ford Foundation has paid the released time of the television instructors to the amount of $139,120 through arrangements made after the project got underway.

The direct operating costs of the system have been financed through the contributions of the participating colleges with each school paying $1,500 the first project year and $2,000 each per year thereafter with the exception of The University of Texas which has contributed $10,000 per year.

In addition to the money outlined above, each school which has a television instructor represented in the system bought the video tape on which its instructor's course was recorded. This by itself represented an additional investment of approximately $18,000 on the part of San Antonio College with two TEMP instructors from its faculty.

Each participating college also bore the full cost of electronic distribution equipment and installation within its campus. This included 23-inch television receivers, distribution amplifiers, coaxial cable and related elements. The average cost to each school was approximately $1,400.

Phase III was not without discrepencies -- electronic, mechanical, and human. Dr. James Gray's opening lecture in "Modern Mathematics" which originated from KONO-TV in San Antonio offered an algebraic formula which shared the classroom television screen with a test pattern inadvertently superimposed by WOAI-TV as it prepared to feed the system later in the morning. There were power failures which defied the laws of probability in that lightning struck the same power source with uncanny regularity.

Two full-time system engineers, each with his own maintenance vehicle, made regular system inspections which included checking not only system relay points along the 100-mile-long wave path but campus systems as well.

A complete file of discrepency reports was maintained for analysis, and this resulted in technical improvements the second year, 1962-63. Chief among the improvements was the addition of fault-finding and reporting equipment along with standby battery power at relay points. There also resulted a program of training in the very fundamental act of turning a television set on and off and in switching receivers to the proper channel (all TEMP classroom instruction is on Channel 2, because there are no broadcast facilities in the areas on this or adjacent channels).

Although the school year 1962-63 occurred after the termination of Phase III, the TEMP story flows without interruption into the second full year of operation. A previously mentioned supplementary grant of $25, 000 by the U. S. Office of Education contributed materially to this second year.

Three new courses were added: "Introduction to the Visual Arts," "Physical Anthropology," and "The Great Frontier," a companion course to Dr. Walter Prescott Webb's "The Great Plains."

The second year also saw the addition of evening school utilization of two courses: "American History" and "Introduction to Psychology." These courses were used primarily by the evening school divisions of the San Antonio College and Texas Lutheran College. However, the courses were available to all participating schools; so that students could view the material permissively for review or as supplementary assistance to a non-televised course of study.

The position of Academic Coordinator was reinstated during TEMP's second year. Dr. E. B. Everitt, Dean of Faculty, Texas Lutheran College, served in this capacity on a one-fourth time basis. It was his responsibility to work much as the dean of a college would in dealing with multiple section problems and assuring uniform instruction in all sections. Dr. Everitt was selected because of his high degree of interest in instructional television, because of his academic standing in the TEMP community, and because of his administrative experience.

During the course of the year, the Academic Coordinator along with the Project Coordinator supervised the selection of textbooks for those TEMP courses, notably "College Chemistry," for which there was no uniform text and concentrated on the development of new instructional materials. Dr. Everitt's chief contribution was as liaison between the classroom teacher and the studio teacher.

Also, through the efforts of the Academic Coordinator a new course in economics was made available for presentation in 1963-64, and the ground work was laid for the development of supplementary materials in Spanish and speech.

During the year, 1962-63, the administrators of the eleven TEMP colleges adopted a new schedule of participating payments. This new arrangement recognized the fact that televised instruction via the TEMP network represented a permanent teaching adjunct and that the time was rapidly approaching when the participating schools would need to afford the financial support not only for system operation but also the cost of new program development. It was recognized that power and other costs remained constant regardless of student enrollment. At the same time, there was taken into account the fact that gross enrollment among the eleven schools varied from a low of 600 students to a high of over 20,000 at The University of Texas. Consequently, the decision was reached that a flat fee of $10,000 for The University of Texas and $2,000 for the other ten institutions would be assessed as a means of meeting minimum fixed operating costs. An additional assessment based on gross enrollment was agreed upon in order to satisfy system needs for academic growth and development. The colleges were grouped by enrollment into four groups with the additional assessments as follows: Group A, $700; Group B, $800; Group C, $900; and Group D, $2,000. This increase in local budget should not be taken to mean, however, that outside money from contract or grant would not be looked upon with favor by TEMP. The move does reflect strongly, however, the acceptance of the system by the participating colleges and their determination to keep the system not only operating, but to assure its growth and continued development.

Another decision reached by TEMP's administrative council was to experiment in new areas of programming over the system, apart from direct teaching. The ability of television to present instructional material in the classroom was not questioned. Rather, the point was made that up to 1963, TEMP had offered only material designed to present two-thirds of a regularly scheduled catalog offering. The desire was expressed that TEMP move in three directions: (1) to continue the two-thirds televised course on a reduced basis, (2) to add supplementary material which might or might not be tied directly to existing catalog listings, and (3) to develop one or more total teaching offering requiring no classroom instructor.

Developments in these areas are underway now.

This, then, is the TEMP story told in broad outline. Further details will be found in the appropriate chapters which follow.

CHAPTER II

COORDINATING INSTITUTIONS OF HIGHER EDUCATION FOR TEMP

The TEMP project has linked together by means of microwave relay eleven Central Texas colleges and universities representing as broad a cross-section of campuses as one would ever be likely to find within a similar geographical proximity anywhere in the United States.

To introduce the reader to these eleven schools, a short description of each of them follows.

Situated at the system's northernmost point is Southwestern University, located in Georgetown, Texas. This is the state's oldest university, chartered by the Republic of Texas on February 5, 1840. Southwestern University, operated under the auspices of the Methodist Church, is composed of a college of liberal arts and sciences and a school of fine arts. There is no graduate division.

The University is co-educational, with a total enrollment of 800. The president is Dr. Durwood Fleming.

Three of the TEMP schools are located 30 miles south of Georgetown in Austin, Texas, the state capital. These schools are The University of Texas, Huston-Tillotson College, and St. Edward's University.

The last named, St. Edward's University, was founded in 1885 by priests of the Congregation of Holy Cross. Today, St. Edward's is still conducted by The Brothers of Holy Cross and is composed of academic divisions of humanities, social sciences, teacher training, physical and biological sciences, and business administration. There is no graduate division, although the charter permits the formation of one. St. Edward's University is a boarding and day college for men, with women admitted to the nursing program. Total enrollment is 800. The president is Brother Raymond Fleck.

Huston-Tillotson College had its origin in the founding of two former institutions: Samuel Huston College and Tillotson College, with the older of the two dating to 1876. Huston-Tillotson is an inter-racial institution with enrollment composed largely of Negro students. Financial support stems primarily from the Congregational Christian Churches of America and from the Methodist Church. Both a Bachelor of Arts and a Bachelor of Science degree are offered. There is no graduate division. Total enrollment is 600. The president is Dr. J. J. Seabrook. The college is co-educational.

The University of Texas is the third TEMP participating school located in Austin. The University is the largest of all the TEMP schools with an enrollment in excess of 20,000. It is, of course, state supported and has a graduate division. Radio/Television at The University of Texas is the production and administrative headquarters for TEMP. Six of the present TEMP television instructors are University of Texas faculty members.

The other state supported institution represented in the system, Southwest Texas State College, is in San Marcos, twenty-five miles south of Austin. Southwest Texas State began in 1903 as a state normal school, and today the undergraduate program of the college is largely teacher preparation with the graduate program strictly teacher preparation. The college is coeducational with a total enrollment of 2,700. The president is Dr. John G. Flowers.

Texas Lutheran College is located in Seguin, thirty miles southeast of San Marcos. It has been a four-year school since 1948, having previously been a junior college. Total enrollment is 700. The acting president is Professor Arthur G. Gustafson.

Texas Lutheran College is co-educational. It emphasizes a limited but well developed program in the arts and sciences, general education and pre-professional curricula in medicine, law, engineering, theology and music. The college considers one of its major objectives to lie in its program of teacher education.

Five of the TEMP participating colleges are in San Antonio, Texas.

San Antonio College is the only junior college in the system. This college opened its doors in 1925 as University Junior College under the administrative supervision of The University of Texas. One year later administrative supervision was shifted to the San Antonio Board of Education. In 1945, however, the college began an independent existence under a newly created Board of Trustees operating through the San Antonio Union Junior College District. It is co-educational, offering the usual freshman and sophomore courses that are given in all standard colleges and universities. San Antonio College operates both a day and an evening division, with a day enrollment of 2,200. The president is Dr. W. P. Moody.

In 1911 a two-year college course was opened to both lay and religion students in San Antonio, Texas, by the Congregation of the Sisters of Divine Providence. In 1919 a four-year program came into being. Since then, Our Lady of the Lake College has continued to offer college work to women through a program of studies emphasizing a liberal education. Our Lady of the Lake offers specialized programs in teaching, social work, library science, dietetics, to list a few. Total enrollment is 925. The president is Dr. John McMahon.

St. Mary's University dates to 1852 as founded by four brothers of the Society of Mary. Originally known as St. Louis College, today St. Mary's University, with admission to regular sessions limited to male students, offers work in the undergraduate schools of Arts and Sciences and Business Administration along with work in the School of Law. There is also a Graduate School. Courses during the day are offered on the main campus which has a total enrollment of 2,000. Evening classes are held in the Downtown College, and there are no TEMP facilities for these classes. The president is The Very Reverend Charles W. Neumann, S.M.

Incarnate Word College is the third Roman Catholic school in San Antonio which participates in the TEMP project. This college for women was founded in 1869 by the Congregation of the Sisters of Charity. Divisional organization shows work available in the humanities, natural sciences, social sciences, nursing, teacher education, and a graduate division. Enrollment is listed as 1,200. The president is Dr. S. Thomas Greenburg.

Trinity University is the result, in part, of three small ante bellum Presbyterian schools in Texas with the first of these dating to 1848. Trinity University, as such, opened its doors in September, 1869, in Tehuacana, Texas, and moved to San Antonio in 1942. The school is co-educational, with special emphasis on the liberal arts. Graduate work is available along with work in law, medicine, and theology. Total enrollment is 1,800. The president is Dr. James W. Laurie.

From the foregoing it is readily seen that the majority of the TEMP participating schools are church related, there being only three of the eleven which are not. Five of the schools have enrollments of less than 1,000 students each. The two enrollment leaders are both state-supported, and these two are approximately 17,000 students apart in their totals. Two of the institutions are for men only, two for women only. But they all have at least one thing in common: the desire to make the best possible educational opportunity available to their students. The administrators of these eleven colleges and universities recognized that TEMP afforded such an opportunity.

As early as January 24, 1957, Mr. Edward A. Sagebiel, then president of Texas Lutheran College wrote that:

> The closed-circuit television network can make available to member institutions the services of distinguished teachers and teachers with unusual fields of specialization who would not otherwise be available under any circumstances.

And then he added:

> Cooperation and coordination between educational institutions will be necessary in making possible a top-quality educational program.

Such cooperation was forthcoming.

The brief profiles of the TEMP member schools help illustrate some of the differences represented, but they do not reflect such problems as divergent bell schedules and school year calendars.

Some of the schools began their classes ten minutes before the hour, some on the hour, some ten minutes past the hour, and one school had daily classes which began on the half hour. Owing to differing religious affiliations, differing holidays were observed and not the same amount of time was devoted to the same holidays. The observation of Thanksgiving was not uniform; some dismissed classes for the third Thursday in November, some for the fourth. In September, 1961, there was a seventeen-day spread between the first day of classes at San Antonio College and opening day at The University of Texas. On the brighter side, there was no time zone problem to contend with.

A meeting for which three hours had conservatively been set aside to deal with these scheduling problems was held. The meeting closed in less than thirty minutes with all major solutions in hand. Shortly after convening, Dr. Clyde Nail, then Dean of the Faculty, San Antonio College, suggested that each school could continue with its traditional bell schedule and forget TEMP or a uniform schedule could be adopted to permit TEMP to function. It was suggested that since The University of Texas and Southwest Texas State College represented the two schools with the largest enrollment and that since both began classes on the hour, all others follow suit. Without debate, this suggestion was adopted. Agreement on the Thanksgiving holiday immediately followed.

Nothing could be done, however, to change the opening day of classes, because catalogs had all been published previously. The solution was to withhold all transmission of TEMP materials until all member schools had classes in session. This was not and still is not an ideal solution, because it means that some colleges hold as many as six class meetings before receiving the first TV lecture of the year while others open classes with television.

There is no immediate solution in sight for this problem other than the one already in effect. All of the TEMP schools, in order to maintain accreditation, offer the same minimum number of class days during a given semester. But because of variations in time needed for registration, final examinations, and special holidays, plus the fact that some hold classes on Saturdays, delaying TEMP materials until all colleges are in session will continue.

It is most doubtful that one could find anywhere a college or university that does not give consideration to campus beautification. For example, Southwest Texas State College has eliminated all overhead wires from its campus. However, when engineering studies indicated the strong desirability of erecting there a 300-foot steel microwave tower in the approximate middle of the campus, the administration's reaction was that this was a sign of progress (see accompanying picture).

Cooperation in the placement of physical facilities was also forthcoming from other sources. A municipal water tower located on Hildebrand Street in the city of San Antonio affords the central receiving and distributing point for the five colleges in San Antonio. The use of this tower would never have been possible without the cooperation of the city of San Antonio's Water Board.

But once the physical facilities were operative and the mechanics of scheduling the instructional materials had been solved there remained the problem of division of cost among the participating institutions for the operation of the system. Since experience was lacking on which to base actual operating costs, only estimates could be used. A figure of thirty thousand dollars per year seemed reasonable. Discussion was given to the distribution of this budget figure among the TEMP schools. It was obvious that the number of students per campus receiving instruction via the system was not a usable criterion in that system power, maintenance, and video tape playback costs remained constant whether one or one hundred students viewed a course on a given campus. Consequently, the operating costs were apportioned as follows: The University of Texas agreed to pay $10, 000 per year with each of the remaining ten colleges paying $2, 000 each per year to raise the necessary $30, 000 total.

The fact that TEMP has joined together institutions of higher education supported in whole or in part by Methodist, Presbyterian, Congregational Christian, Lutheran, and Roman Catholic Churches has not been discussed up to this point as a factor relating to institutional cooperation. As a matter of fact, church-relatedness has not emerged as an important factor in the project. Although evidence is lacking to support the idea, any adverse matters relating to cooperative efforts by the eight church-related institutions may have been resolved previously through their membership in the Texas Council of Church-Related Colleges and the National Council of Church-Related Colleges.

It is entirely possible, on the other hand, that total student enrollment (college size) could have been a factor working against full cooperation. However, this factor was recognized from the beginning and was taken into consideration. Some fear was expressed by faculty members of smaller schools that the system might become "the lengthened shadow of The University of Texas." Practices carried out over our two years' operational existence have erased this fear. With fifty per cent of the studio instructors coming from The University of Texas campus, with each institution being represented in curriculum planning, with each institution being responsible for examining and grading its own students, and with key administrative personnel for the system coming from other than The University of Texas faculty, these fears soon disappeared.

Coordinating the system's playback schedule of instructional materials with the needs of the participating schools has required constant supervision. This supervision is highly recommended. Illustrations may help to clarify. Each classroom teacher on each of the eleven campuses utilizing a given TEMP course is provided with not only a catalog of first and last days and holidays for TEMP but also with a complete calendar giving the playback date for each individual lecture.[1] A teacher's manual is also provided which outlines the content for each televised lecture.[2] In theory, the classroom teacher could assume the role of lecturer whenever there is a breakdown in the system. In practice, this does not always work, for obvious reasons. In such an instance, someone must assume the responsibility of scheduling a "make-up" showing of the missed lecture. And, for sound public relations reasons, someone must be prepared to correctly explain the reason why the lecture was not delivered onto the classroom television screen.

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[1] See Appendix for example.

[2] Teacher's manual for "Introduction to Psychology" reproduced in Appendix.

It has been the role of the Project Coordinator to handle these emergencies and also to travel periodically to each of the campuses and talk directly with the classroom teachers about matters of picture and sound reception. Since the post of Project Coordinator has not been a full-time one due to budgetary limitations, this travel has not been as frequent as perhaps it should have been, but these visits are deemed to be vital to the proper coordination of the project. Written communications, letters and the monthly TEMP Newsletter, while helpful, cannot replace the constant need for face-to-face discussion.

In conclusion, the most urgent first need for coordination among the TEMP colleges rested in the area of bell schedules and school calendars. Class meeting times were cooperatively changed to the uniform time of beginning on the hour throughout the system. Church-relatedness has not been found to be a factor in coordinating the participating institutions in their use of TEMP materials. Once the system was in operation, communication between the various widely separated classrooms and the main system office on the campus of The University of Texas had to be maintained on a regular and "personal" basis. The need is recognized for at least one full time person not only to schedule TEMP materials for the network but to travel on a regular and frequent basis to the participating schools to obtain constant "feedback" from the classroom teachers. This travel is now done on a part-time basis.

On the other hand, as electronic reliability increases (and it has increased greatly during TEMP's two full years of operation) eliminating the necessity for unscheduled "make-up" lectures missed because of system failure eliminates the need for last minute schedule changes.

As a final word, it must be pointed out that the job of coordinating activities for TEMP has been possible only because of the whole-hearted cooperation with which the participating colleges have entered into the project.

CHAPTER III

PROGRAMMING THE TEMP CURRICULUM

The TEMP curriculum was developed as a cooperative effort of the eleven colleges involved in the project, with financial assistance from The Ford Foundation. Under the terms of the application made and the grant received from The Foundation courses were to be those ". . . of clear academic value the teaching of which by television would make a genuine contribution to the problems of large enrollments and inadequate numbers of qualified faculty persons."

These criteria tended to make eligible only courses taught on the undergraduate level. Only these courses could provide the necessary "large enrollments." The provision requiring courses in areas characterized by "inadequate numbers of qualified faculty persons" made course selection doubly difficult; for at the time of the TEMP development there were few large enrollment courses which also had inadequate numbers of faculty members available. It was, therefore, necessary to interpret the latter provision as referring to probable future faculty needs. As it developed, two of the TEMP offerings did provide faculty where no qualified teachers were available.

A further restriction was placed on the system by the membership of a junior college in the project. By state law, this school could offer courses only on the freshman-sophomore level. While this would seemingly be no problem in view of The Ford Foundation requirements, it did tend to eliminate some of the desired courses which were normally taught on upper division levels and some teachers who taught nothing but upper level courses.

From the beginning of the system there was a demand from the participants for an offering of "enrichment material." The almost total lack of other production and faculty salary funds for purposes other than full credit offerings made it impossible to program enrichment materials during the initial stages. However, the demand for these enrichment materials was such that during the second year of operation it was found desirable to set aside other funds and to provide some non-credit programming.

The participants in the project clearly understood the financial position, yet the most frequent complaint was the restricted nature of the curriculum.

Early Developments

The system administrators met with representatives of The Ford Foundation during early policy planning sessions. Later the TEMP Academic Coordinator acted as system representative in meetings which worked on problems dealing with actual proposals.

Preliminary meetings produced a profusion of suggestions for courses. It often seemed that each school desired its entire lower division curriculum taught by television. However, through various discussions, questionnaires, and telephone conversations a reasonable slate of proposed courses was prepared and distributed for final approval.

To a large degree the first courses selected for the system were chosen from those being used by The University of Texas' campus closed-circuit operation. The University had, for five years, been using closed-circuit television for teaching various courses or portions of courses. This was expanding at a rapid rate; and, as it expanded, there became available a body of experience in production in certain content areas.

The desirability of using The University courses was not at all questioned by the system participants and was viewed favorably by most. The areas involved were chemistry, German, and psychology. Success had been achieved in television teaching in each of these courses on The University campus, but in each instance the television instructors involved were aware of definite ways in which the courses could be improved if time and money were available for producing the courses anew. This was part of the backlog of experience to which previous reference has been made. Consequently, an early decision was reached to redesign each of these three courses with experience as the guide now that foundation money could make this possible. In addition, most of The University of Texas teachers were well known to the faculties of the participating colleges.

The University of Texas could not have provided all the courses even if it had been requested to do so; because in several cases it did not offer a desired course. One of these, "Science for Elementary Teachers," was uniquely a course offered by Southwest Texas State College in San Marcos. It was in such courses as this that the system planners were depending on the smaller schools to volunteer instructors.

Production

At preview sessions of courses in the process of production there were concerns expressed by faculty members about dangers of "over-production." What these individuals had in mind was usually what the production personnel considered "showmanship," what critics termed "commercialism," and what the majority of viewers seemed to feel was "professional technique." Generally, there appeared to be a feeling among faculty that "it is all right for other fields, but not mine." Math teachers liked the skits in German but preferred a straight-forward, "traditional" approach to math. This was a division of opinion that was never completely resolved; but satisfactory working compromises were reached in all courses.

While the program planning personnel did not necessarily share the desire of some teachers to make television presentations exactly the same as ordinary classroom teaching, they did have some doubts concerning courses produced outside the more educationally oriented environment of The University of Texas. Previous efforts of other colleges to produce courses in cooperation with commercial stations had sometimes ended with products of mediocre quality. High quality production was deemed absolutely essential to the system's success. The original plans called for a full production staff at San Antonio as well as in Austin. Budget restrictions later reduced this to only a single San Antonio producer whose multiple function would be to produce, direct and in other respects coordinate production with the cooperating San Antonio commercial stations. The problems of this position were somewhat eased by utilizing the art department, some staff personnel and others from

The University of Texas in Austin, but the situation was seldom ideal for the San Antonio producer.

The Academic Coordinator made every effort to involve as many of the cooperating colleges as possible in the planning, teaching, and total production of the courses. An effort was made to have The University of Texas involved in no more than one half of the beginning courses, anticipating that in the future the other schools would contribute as much as three-fourths of the courses of the total curriculum. Uppermost in the minds of the producers originally had been the desirability of getting everyone involved in as many ways as possible, and certainly they were ever mindful of the technical impossibility of stretching The University's production facilities. To some extent these limited facilities tended to allay fears by some smaller schools that The University would run the system completely. It was in those early months technically impossible for The University to replay all of the TEMP programming. This condition existed until late 1961 when an additional video-tape machine was acquired. Originally, tape feeds were made from Austin during some hours and from commercial facilities in San Antonio during others. This arrangement was shown to have obvious drawbacks when commercial programming took precedence in several instances over the scheduled TEMP programs. After the first semester of full system operation all feeds were made from Austin.

Although the Project Director and the Academic Coordinator as well as others on the planning staff made every attempt to restrict the participation of The University of Texas to one of leadership and example, the efforts were sometimes misinterpreted. A few of the cooperating schools felt they had been overlooked during some of the planning. Frequently the oversight was the result of taking literally the statements of various college officials. Several school presidents made statements to the effect that they did not feel their schools would have much to offer the system in its beginning operation. Later these same men complained that their schools had not been asked to participate more fully. The opportunities for the future use of all schools seemed so unlimited that such minor concern was widely felt to be premature.

Development and Production of Courses

Once the decision had been reached to use a course on the system, a group of representatives from the various schools met to decide on a teacher, the basic course content, a textbook or books, and if possible, to establish a desirable time for the course to be aired. Meetings were held as frequently as necessary to make these decisions. In some content areas one meeting was found to be sufficient, with sub committees completing the detailed work. Others required a series of meetings with little or no outside discussion.

Attendance at these meetings was, for the most part, quite good. Chairmen of the various departments concerned were the principal delegates, although there was sometimes representation by other members of the teaching staff. Frequently at these meetings high ranking administrators sat in on the discussions, usually as interested but non-participating observers.

There were certain unifying elements which helped the members of the groups to design general outlines of presentation, agree on texts and even arrive at a selection of teachers. Primary among these was the fact that a majority of the group members were either graduates or former students of The University of Texas or Southwest Texas State College. They had, therefore, developed similar fundamental ideas. They also knew each other by name, if not in person, and there were often recognized leaders among them. Even when there was no common background of experience there was a surprising degree of standardization of courses taught by the various schools.

The majority of the textbooks used by the schools were either by the same authors or basically the same in content. There were no texts suggested that were completely foreign to the members of a specific group, although there was often a considerable difference of opinion as to the merit of some. Some groups selected a series of reference texts when no single text seemed to fill the requirements demanded by the members. Anticipated by system planners as one of the near impossibilities of agreement, text selection proved one of the easier tasks.

The selection of a teacher in the case of courses already previously taught by television at The University of Texas left little choice to the preparation groups. There was some evidence to indicate that given a choice the groups would have selected these teachers anyway, primarily because of the teachers' past television experience and proven ability. A few minor protests were expressed, but these centered more on the teacher's technique than on his ability. For example, the German language group was somewhat at odds over the desirability of using skits in teaching the course, a device which had been developed by the teacher.

For groups which had to make a choice between several available teachers the decision was not so quickly reached.

Another real factor involved in the selection of the television teacher related directly to cost. No grant money was available to defray the cost of the video tape on which the various courses were to be recorded. Consequently, it was decided that the college providing a television instructor, or instructors, would buy the tape from its own college operating budget. Average cost of video tape for a two-semester course which represented sixty 45-minute lectures was $9,000.00 In other words, before a participating college offered the services of one of its faculty members it needed to examine its budget carefully in search of video tape money. This factor alone was enough to discourage the smaller school from actively campaigning to have a course taught by a member of its teaching staff, despite the fact that the faculty member's released salary would be paid from The Ford Foundation grant.

Content planning for the original presentations was, like textbooks, not as difficult as had been anticipated. Again, there was not the wide difference in content from school to school that many believed existed. Basic courses contained basic elements and covered basic materials. While some schools covered more materials than others there was always a common core which had little deviation from the norm in all schools. The order of presentation was determined to a great extent by the textbook. For minor disagreements it was suggested that schools use the frequent non-television discussion periods to present materials in their own way.

It can be concluded that there was little major disagreement within the course planning groups, particularly in the planning of the opening presentations for the system. Later on there were to be many suggested changes in content, presentation and even teaching personnel, but these were to be expected, particularly after the faculties became more sophisticated about viewing instructional television.

When disagreements developed concerning course content and particularly teaching technique, it was often the most practical solution to have a demonstration of the various ideas and then to let the group or perhaps an unbiased outside set of viewers make a judgment. These demonstrations were done on videotape and presented just as the finished product would look. They proved extremely effective and were neither expensive nor overly time consuming.

By summer of 1960, the complete list of courses and the television instructors for them had been compiled. The first year of operation called for four courses taught by University of Texas faculty members, and four courses taught by faculty members from three of the other participating colleges. San Antonio College had two faculty members represented on the TEMP teaching staff. It should also be pointed out that Dr. James Gray of St. Mary's University had also had previous television teaching experience through the presentation of his college level mathematics course over the facilities of a commercial San Antonio television station. The following chart summarizes the courses for TEMP's first year, the instructors, and their resident college.

Course	Instructor	Institution	No. of Institutions Utilizing Course
American History	David Trimble, Ph. D.	San Antonio College	8
College Chemistry	L. O. Morgan, Ph. D.	The University of Texas	9
Focus on German	Leroy Shaw, Ph. D.	The University of Texas	9
Great Plains	Walter Prescott Webb, Ph. D.	The University of Texas	8
Introduction to Psychology	Fillmore Sanford, Ph. D.	The University of Texas	10
Modern Mathematics	James Gray, Ph. D.	St. Mary's University	8
Music Appreciation	Marjorie Walthall, Ph. D.	San Antonio College	6
Science for Elem. Teachers	R. T. Gary, Ph. D.	Southwest Texas State College	5

All of the course planning members requested teacher and student guides. These guides, which took several forms according to the desires of the members, were primarily designed to keep all of the classes together and to allow teachers to anticipate the television lecture. Some of the guides were weekly lesson outlines while others were complete manuals for students. It appeared that the fuller guides ought to be discouraged because students tended to rely too heavily on them. The outline guides were more manageable and forced the student to do more outside preparation. The guides were particularly useful in those courses using multiple texts.

Testing

The problems involved in administering student examinations were some of the first mentioned in connection with the system. From the beginning it was made very clear that student evaluation was to be an individual college problem. It was suggested and rejected that the system become a credit awarding entity. Further, it was suggested and rejected that the system set up a grading bureau. Most schools opposed the idea of having classes compared with each other, particularly of having schools ranked on a basis of class achievement. However, the schools desired some assistance with course examinations and requested that the television teacher prepare sets of suggested questions. The television teachers agreed to provide such questions, but they, too, declined any suggestion that there be a centrally administered and graded examination. The Research Director did some comparative examination; however, the objective was not to rank the institutions but to determine the value of the course content. His report contains a full review of these tests.

In summary, the problems of programming the TEMP system were basically the following:

1. Initial selection of courses to begin system operation.
2. Development of course content to coincide with that desired by a majority of the cooperating schools.
3. Selection of teachers for the initial courses.
4. Production and recording of initial courses.
5. Preview and revision of initial courses.

6. Standardization of necessary accessory equipment needed at each school for "Music Appreciation" course, such as record players and recordings.

7. Agreement among cooperating schools on time schedules, length of classes, and number of presentations per week.

8. Agreement on minimum number of schools which would offer a course to make it worthwhile for the system to offer it

9. Selection procedure for students to participate in TV classes.

10. Determination of academic level for each course.

11. Preparation of handbooks, guides, and other materials for students and teachers.

12. Selection of acceptable textbooks.

13. Procedures for evaluation of students in TV courses.

14. Procedures for evaluation of TV courses.

15. Evaluation of university-produced or commercially produced materials for future system use.

16. Consideration of enrichment materials for system use.

17. Evaluation of production techniques used by system.

18. Development of cost/effectiveness ratios between television and non-television courses.

19. Long range planning for future programming.

CHAPTER IV

SELECTING TEMP TEACHERS AND DEVELOPING INSTRUCTIONAL MANUALS

On September 18, 1961, the Texas Educational Microwave Project -- TEMP -- began its first full year of operation. During that year, eight previously videotaped college level courses were presented to students enrolled in eleven different Central Texas colleges. Now, two years later, it is possible to write from "hindsight" and not only describe what procedure was followed in selecting the instructors for these courses but perhaps also to set down some guidelines for the selection of future television teachers. And while discussing the television teacher, it will also be possible to relate experiences concerning manuals -- both those for the classroom teacher and those for the students -- which may be prepared by the television instructor.

A previous chapter, number two, described the process through which the two broad categories of courses presented on the microwave network were developed. These categories were: courses unique to one or two participating colleges which TEMP could make available to all of its members and courses uniformly offered in every curriculum. "The Great Plains" taught by Dr. Walter Prescott Webb and "Science for Elementary Teachers" by Dr. Thacher Gary of Southwest Texas State College are representative of the first type of course while "American History" and " Modern Mathematics: Algebra" represent the second. In the case of uniformly offered courses the first problem was the choice of the course itself; then came the process of selecting the instructor to go before the camera.

A number of factors were operative in the selection of the television teachers. To begin with, the size of The University of Texas in comparison with the size of the ten other cooperating institutions had to be taken into account. The total student enrollment of The University was, and still is, greater than the combined enrollment of the other ten colleges in the project. This together with the realization that teaching by closed-circuit television on The University of Texas campus had been carried on for five years prior to the establishment of TEMP's cooperative network led some of the smaller colleges and universities to fear that teaching on the system would be "a lengthened shadow of The University of Texas." While this fear has proved to have been groundless, an early effort to allay it was made through the provision that at least fifty per cent of TEMP's television teaching staff would come from faculties other than The University's.

It was also true that despite the fact that The University of Texas was the only educational institution in the system that owned television production facilities, these studios were not extensive enough in either equipment or staff to produce all eight of TEMP's courses. The solution was found through the cooperation of San Antonio's commercial television stations which made both facilities and staff available. Five of the eleven TEMP schools are located in San Antonio and a sixth college, Texas Lutheran, is located but thirty miles from San Antonio. This combination of geography and facility availability made the selection of teachers who were resident to San Antonio highly desirable.

One other factor outside the realm of teaching ability was also placed into the selection equation. The Ford Foundation had agreed to pay the full-time released salary of each TEMP teacher, and the grant from the U. S. Office of Education through Title VII-B of the National Defense Education Act helped defray production costs. However, no outside money was available to meet the cost of video tape; so it was decided that each college with an instructor represented on the system would purchase the video tape on which his lectures were recorded.

In the case of San Antonio College which has two of its faculty members teaching via television over TEMP, the video tape cost approximately $18,000.00.

The foregoing, then, were some of the considerations bearing on the selection of the first eight instructors chosen to take leave from their classrooms and to lecture instead before the television cameras with video tape machines instead of students as the first recipients of the professor's remarks. The practice of tape recording the lectures was not uniformly accepted as desirable at first by TEMP's teaching faculty. The major objections, which soon disappeared, are discussed in the next chapter. However, the point to be made here is that the video tape machines were utilized in making the selection of TEMP faculty. In some instances, prospective television teachers were given "screen tests" which were video taped, and then the performance was reviewed by heads of departments from the TEMP schools.

Dr. Walter Prescott Webb was the first faculty member selected. Dr. Webb's eminence as an historian, his extensive publications and the fact that nearly every participating college counted at least one of his former students among its faculty all contributed to his selection. Dr. Webb, in contrast to the next three faculty members chosen, had never before taught a class by television. Drs. Morgan, Shaw, and Sanford, on the other hand, were early choices due largely to their previous television teaching experience. These four professors constituted The University of Texas contribution to the TEMP television faculty. There remained, then, the problem of selecting instructors for the four remaining courses: "Science for Elementary Teachers," "American History," "Music Appreciation," and "Modern Mathematics."

The selection of an instructor for the course in "Science for Elementary Teachers" was narrowed at the first meeting of heads of departments in this area to two possible teachers: Dr. R. T. Gary from Southwest Texas State College and Mrs. Adolph C. Streng of Texas Lutheran College. Both teachers came to the television studios of The University of Texas and recorded a typical lecture which was then shown to the department heads. Biographical data sheets on both instructors were also given out. The choice went to Dr. Gary, and Southwest Texas State College agreed to pay the cost of the video tape for his course. Since Dr. Gary's campus was only thirty miles from Austin, home of The University of Texas, it was decided that he would commute to Austin instead of traveling the forty-five miles to San Antonio to record his lectures. This made it all but mandatory that the three remaining instructors come from the San Antonio area.

St. Mary's University of San Antonio suggested that Dr. James Gray of their mathematics department teach the course in "Modern Mathematics":

one semester of algebra and one of trigonometry. Dr. Gray had had previous experience in television teaching in that he had taught one complete course over the facilities of one of San Antonio's commercial television stations. He was highly regarded by his colleagues on the other TEMP campuses both as a mathematician and as a teacher of mathematics. His university agreed to buy the necessary video tape.

The selection of the teacher for "Music Appreciation" paralleled that of the instructor for "Science for Elementary Teachers" in that the heads of the various music departments concerned quickly narrowed their choice to two faculty members. Both were from San Antonio schools, Trinity University and San Antonio College. Mr. Albert Bayes of Trinity University then withdrew his own name from consideration, leaving the television assignment to Dr. Marjorie Walthall of San Antonio College.

The course in American history witnessed the largest number of teacher nominations of any of the TEMP courses. The final choice was made from a field of four: George Hester, Southwestern University; A. G. Wiederaenders, Texas Lutheran College; Emmie Craddock, Southwest Texas State College; and David Trimble, San Antonio College -- all with the Doctor of Philosophy degree. Geography ruled out the history teachers from Southwestern University and from Southwest Texas State College. Again, the process of "screen testing" was carried out and the choice went to Dr. David Trimble of San Antonio College.

Thus were the original eight TEMP instructors selected. Four were from The University of Texas, and three of these four had had previous closed-circuit television experience. The courses involved were "College Chemistry," Dr. L. O. Morgan; "Focus on German," Dr. LeRoy Shaw; "Introduction to Psychology," Dr. Fillmore Sanford; and "The Great Plains," Dr. Walter Prescott Webb. Other schools to be represented on the TEMP television faculty were Southwest Texas State College, one instructor, St. Mary's University, one instructor; and San Antonio College, two instructors.

With the selection of the teachers completed, the next step was to assist them in adapting teaching technique and materials to television. The problem was not related nearly so much to course content as it was to the flexibility, the adaptability of the individual instructor.

In every instance the instructors selected to record their course content for use on the microwave system were given approval by their colleagues as being competent in their various content areas. There has never been occasion or cause to question any of the TEMP television teachers' grasp of his subject. Questions have been raised, however, over some of the instructors' ability successfully to adapt from a conventional classroom presentation to television. This may relate, to some extent, to peer pressure. Faculty fears of "showmanship," of "over-production" were expressed by some from the beginning stages of TEMP's development.

What has been interesting to note is that those faculty members who voiced fears that the presentation of a course by television would tend to subtract from the dignity of the material through the use of sets, lighting, graphic devices and other production tools were generally the first to criticize those few courses which were somewhat remiss in utilizing the full potential of a television presentation.

The role of the director was brought into clear focus during the production period of the courses. The operating philosophy was -- and still is with TEMP -- that the television teacher is responsible for course content while the director is responsible for assisting and advising the teacher in adapting that content to television. They work as a team with a common objective: the use of instructional television to enhance teaching effectiveness; to make possible the presentation of visual teaching techniques not normally possible or available in the normal classroom situation; to make more graphic those concepts which verbalization alone does not always succeed in putting across. The TEMP production staff has never taken this to justify the use of "gimmicks" or even the use of a picture merely for the sake of "something visual." It came as somewhat of a revelation to some of the television instructors to discover that the TEMP directors were as vitally interested in effective teaching as they were. Others continued to resist the director's efforts to help them maintain student interest and to help them utilize all the resources of television as an effective teaching medium.

However, experience brought about corrective measures that the director was unable to achieve during original production. Once the classroom teachers began using the television lectures in the classroom and were able to compare the work of one television instructor against that of another, those examples of instructional television in which the full impact of the medium was in effect brought forth requests that portions, if not all, of those lectures which could best be described as an instructor "merely standing before a camera for forty-five minutes and talking on and on" be redone.

The system's second year of operation witnessed this recommended reproduction of selected courses.

It was recognized that some kind of course manual or syllabus would be needed for the classroom teacher. The extent to which these were written in detail varied considerably from one television instructor to another. The manual prepared by Dr. Webb to accompany his televised lectures on "The Great Plains" consists of an average of two typewritten pages for each lecture. Each lecture is summarized in one or two short paragraphs, an outside reading list is suggested, and the classroom teacher is given approximately fifteen questions for class discussion.

The syllabus for "Science for Elementary Teachers," on the other hand, contains on an average of eight typewritten pages per television lecture or four times as many pages per television presentation as does the manual for "The Great Plains." This does not mean that one instructor did a better or more thorough job of manual preparation. Instead, it illustrates that the manuals were designed for specific courses. The manual's function was to permit the classroom teacher to have at hand sufficient information so that he could conduct the lecture himself in case of equipment failure, would have review material available when constructing examinations, and could make reading and other assignments.

Only one course, "Focus on German," was originally planned with a student manual. In fact, a textbook, a student drill manual, audio laboratory tapes, and a teacher's manual were all prepared to accompany the video tapes for this course. In other words, instead of selecting an existing text and existing laboratory drills, all teaching aids for the course stemmed from the television presentation.

After the first semester, a privately printed student manual was produced for the course in American history This manual was, in essence, an edited version of the scripts used by the television instructor.

In no instance was what might be termed a "student television notebook" prepared. This is now considered to have been a mistake, and the preparation of a student notebook for "College Chemistry" is underway. This notebook will to a large extent free the student from extensive notetaking during the course of a given television lecture allowing him, instead, to concentrate on what is on the television screen. Vocabulary, formulas, definitions, and other basic material for each lecture will be in a notebook accompanied by sufficient blank space for brief notation by the student.

To this point very little has been said directly about the classroom teacher, and a few words about this member of the television teaching team may well be in order. The best designed and executed instructional television series possible is virtually useless unless utilized by the classroom teacher. The final choice of whether or not to use any given course as offered over the TEMP network has, with one or two exceptions, been left to the individual teachers in the classroom. Exceptions have been instances in which department heads or academic deans have directly instructed a teacher that his students would be taught by television. Such happenings were rare with the rule being that individual teachers not only elected whether or not to use a course but also decided how the televised presentations were to be utilized.

Despite the fact that TEMP's courses were designed to present two-thirds of a total course by television, some classroom teachers continued to lecture "live" and would assign their students to view only selected portions of the televised lectures.

Lack of uniform utilization of the TEMP courses by the classroom teachers was a result, for the most part, of insufficient training and indoctrination in the use of instructional television. Many of the classroom teachers simply did not know what to do with the new instructional medium which some felt had been thrust upon them. As a consequence some either misused or refused to use the material. While these teachers were in the minority and while they tended to be concentrated in one or two of the participating schools, they helped to make clear the need for utilization workshops. During the second semester of TEMP's initial operation, such sessions were held. Classroom teachers shared their experience in conducting the "third hour discussion periods," in dealing with student questions raised by the television teacher, and generally discovered that television was a very effective teaching adjunct when given a fair opportunity.

One of the early lessons learned in working with the classroom teachers was to avoid at all costs the term "master teacher." Although the expression had gained some national usage, any reference to one of the TEMP television instructors as a "master teacher" met with immediate resistance on the part of a large number of the TEMP classroom staff. The acceptable solution was to refer to "television teachers" on the one hand and to "classroom teachers" on the other. This aspect is presented more fully in the chapter dealing with college utilization of the TEMP offerings.

In conclusion, although whether an instructor resided in San Antonio rather than in Austin was a factor in the selection of some of the TEMP teachers, this in no way ruled out the selection of teachers competent in the various content areas. It is also true that having a number of the participating colleges represented on the television teaching staff has been one of the projects's real strengths. If there were weaknesses in the selection of TEMP television teachers, they probably stem from not having more colleges represented on the teaching staff. It is entirely possible that a greater sharing of faculty resources and perhaps improved instruction would have resulted had more than one instructor per course been selected. What is in mind here is the use of specialists to teach units of a single course instead of one instructor presenting all of the lectures in a subject.

In selecting television teachers experience shows us that consideration should be given to the instructor's ability to work as a member of a teaching team: a team composed of himself, the studio director, and the classroom teachers who are to utilize his material.

The amount of time a teacher has available for the production of his television lectures also needs to be considered. Fortunately, all of the TEMP television teachers were released full time from their regular teaching duties to prepare and produce their courses. We still feel that the original teaching of one course on television comes very close to being the equivalent of a full-time teaching load. The teacher should also have time available to remake portions of his television lectures after weak points have been discovered through classroom use.

CHAPTER V

COLLEGE UTILIZATION OF TEMP TELEVISION OFFERINGS

The Texas Educational Microwave Project -- TEMP -- has made it possible for a college level course to go from the system's production center in Austin simultaneously into the classrooms of the eleven Central Texas colleges which participate in the project. There is nothing electronically astounding about this, although it is possible that the tendency has been to place undue emphasis on the physical system as opposed to the human and other non-electronic features involved. This is not to say that the use of microwave rather than coaxial cable or the use of video tape rather than kinescope or the employment of image orthicon instead of vidicon cameras does not constitute matter for discussion -- the following chapter is devoted to equipment -- but, to paraphrase a current television cereal commercial, TEMP is for people. It is specifically for students in the classroom and regardless of how well produced the instructional lectures may be, unless seen by students in the classroom the project falls far short of its mark. At the time of this writing, courses televised over TEMP's closed circuit network have been seen by over 10,000 students, clear evidence that the product has reached the consumer. This does not mean that each of the eleven participating schools in the TEMP system has utilized all of the courses presented over the system or that all students were taught by television in a given course on a given campus. Why some of the TEMP colleges used more TEMP courses than others and why some schools offered more sections of a given TEMP course is the subject of this chapter.

The programming format employed to date calls for two 45-minute television presentations each week with local instructors conducting the entire third period live. Not all of the TV lectures fill the full 45 minutes. This third period is devoted to discussion, answering student questions, and giving quizzes. The short time remaining following each of the television lectures may be used for student questions or to make reading assignments.

The following tabulation shows utilization during the first semester of TEMP operation for the eight courses offered in September, 1961.

COURSE	NUMBER OF COLLEGES UTILIZING COURSE
AMERICAN HISTORY	8
COLLEGE CHEMISTRY	9
FOCUS ON GERMAN	8
GREAT PLAINS	7
INTRODUCTION TO PSYCHOLOGY	9
MODERN MATHEMATICS	8
MUSIC APPRECIATION	6
SCIENCE FOR ELEMENTARY TEACHERS	4

This listing does not reflect, of course, multiple sections on a campus or student enrollment. And while it does reveal that no course was utilized by all eleven participating institutions, it gives no indication why this was the case. Reasons for non-utilization are generally known, however. It may be well to begin with the three courses which experienced the lowest rate of use: "Science for Elementary Teachers," "Music Appreciation," and "Great Plains." All three of these are courses outside the core curriculum of the majority of the participating colleges. "Science for Elementary Teachers" could be used only by those member schools offering work in teacher preparation. This meant that only seven of the eleven colleges were eligible to offer the course. The University of Texas experienced a series of misfortunes in losing instructors chosen for the campus portion of the course -- although approved as a science credit offering -- and has not activated the offering. Two of the colleges were unable to schedule classes at the time the course was available over the network.

"Music Appreciation" was not used by five of the schools either because the course as offered over TEMP was of two semesters' duration while their curricula called for a one-semester course or because of scheduling conflicts. Since the course was not designed for music majors, schools were reluctant to make major schedule changes in order to accommodate an elective course.

"The Great Plains" is a junior level course and of major interest to students with a concentration in history. This naturally eliminated its utilization by the system's junior college, San Antonio College. The hour at which it was offered, Monday, Wednesday, and Friday at 12 noon, also worked against its utilization.

The remaining courses, history, chemistry, German, psychology, and math, are ones which all of the colleges found readily acceptable in terms of curriculum, although none of the courses was utilized by all eleven schools either because of scheduling conflicts or for reasons best known to individual faculty members.

Perhaps a listing which indicates utilization by colleges will shed additional light on the extent to which TEMP materials were used during the first semester of operation.

COLLEGE	NUMBER OF TEMP COURSES USED
Southwestern University	6
The University of Texas	6
Huston-Tillotson College	4
St. Edward's University	6
Southwest Texas State College	7
Texas Lutheran College	4
Incarnate Word College	7
Trinity University	1
San Antonio College	6
St. Mary's University	5
Our Lady of the Lake College	7

It is immediately apparent that out of the eight courses available, three of the colleges used all but one course, and at the same time one school utilized only one of the TEMP offerings.

San Antonio College, by reason of being a junior college, could use only six of the eight; and this is the number it did utilize. But what is interesting is the fact that all three of the schools which utilized seven of the eight could have utilized all of the offerings had a factor referred to as philosophy of teaching not been operable. Southwest Texas State College, for instance, served notice from the beginning stages of program development that it would not utilize any freshman mathematics course via television. The reason related directly to the college's method of teaching math, a system by which approximately eighty per cent of each class period was spent with all students at the chalkboard solving problems. One of the other schools reported that it felt that psychology was too personal a course to be taught by the impersonal method of television.

One aspect of utilization that neither of the above tabulations indicates is that those colleges which participated most actively in the planning and development of the TEMP courses utilized more of the finished product than did their less active sister institutions.

Generally, the colleges followed one of two courses of action -- or non-action -- during the developmental stages of the project. These two courses might best be described as those of active participation as opposed to passive interest. Three of the schools actually changed from a course of active to passive interest during the later stages of project development and in all three cases the change was accompanied by a change in the colleges' top administration. As new college presidents took office, it was only natural that this project in instructional television was not really theirs and hence failed to arouse the degree of proprietary interest characteristic of administrators who had participated from the beginning.

The presidents of the participating colleges constitute TEMP's administrative council. This group, with the cooperation of the Director of Radio/Television, The University of Texas, was responsible for the project's coming into being. Each college president made the original decision for his school to enter into the project. Committees composed of faculty representatives of the TEMP colleges then worked on such problems as selection of courses and the selection of television teachers for the courses. Some of the college presidents were vigorous in their insistence that representatives from their faculty attend and actively participate; others made only mild overtures to their staff. Two attitudes existed: one, that this is a cooperative project which requires the active support of my administration and of my faculty, and two, that they are going to keep the project going, and my school will watch it develop. The first attitude was certainly the prevalent one.

However, as stated previously, those administrations and faculties most active in course planning, in teacher selection, and in other developmental aspects utilized the larger number of TEMP courses. As one classroom teacher expressed it: "we are using the fruits of our own labor."

What kind of course resulted from committee planning? There is no single answer to this question unless it is that group discussion permitted the classroom teachers to say what they were accustomed to offering in their individual classrooms and at the same time allowed the television teacher to explain his intentions for the course so that all concerned had general foreknowledge about the course. The general approach of the committees was to recommend subject matter units to be included leaving the treatment of the subject to the television instructor. The effect of this on utilization may well be illustrated by the reaction of two faculty members to the course in psychology. The classroom teachers had assembled to preview some of the video taped lectures for "Introduction to Psychology." Following the viewing session, a teacher from one school remarked that it would be a pleasure to use the television course because Dr. Sanford followed so closely his own approach to the subject. An instructor for a second college remarked that Dr. Sanford's presentation was in nearly all respects completely different from his own and that he would enjoy using the television course because of the lively discussion it would afford.

At this point in the discussion of utilization, other factors relating to the problem can best be presented through a comparison of first semester against second semester usage. To help in this, we will combine the previous tabulations with those for the second semester.

COURSE	NUMBER OF COLLEGES UTILIZING	
	FALL SEMESTER	SPRING SEMESTER
AMERICAN HISTORY	8	8
COLLEGE CHEMISTRY	9	6
FOCUS ON GERMAN	8	9
GREAT PLAINS	7	not offered
INTRODUCTION TO PSYCHOLOGY	9	5
MODERN MATHEMATICS	8	8
MUSIC APPRECIATION	6	6
SCIENCE FOR ELEMENTARY TEACHERS	4	4

With the exception of "Great Plains" and "Introduction to Psychology," all courses offered the first semester were the "A" part of two-semester presentations. The two exceptions covered their subject material in the one semester only. "Great Plains" was not repeated the second semester because pre-enrollment surveys indicated that only one school would have sufficient enrollment for the course. "Introduction to Psychology," on the other hand, proved to be so popular that it was repeated the second semester.

"College Chemistry" experienced the largest utilization decline of any of the two-semester courses in that three colleges dropped their televised sections of chemistry in the spring of 1962. The reasons were different for each of the three institutions. Despite an earlier statement that this was not a chapter about equipment, electronic gremlins caused Southwestern University in Georgetown to decide against continuing to use "College Chemistry." Southwestern began the fall semester using both "Modern Mathematics" and "College Chemistry." Both television courses were offered at the 8:00 a.m. hour: mathematics on Monday, Wednesday, and Friday, and chemistry on Tuesday and Thursday. During the course of the semester, Southwestern classrooms failed to receive math only three times because of equipment failure; chemistry, on the contrary, experienced twelve equipment failures on this one campus. In spite of engineering assurances that all faulty equipment had been replaced, the chemistry faculty at Southwestern elected to wait until the following year before utilizing the TEMP course again.

A change in personnel caused the deletion of "College Chemistry" at one of the other TEMP colleges. A departmental chairman who had been very active in developing the course took a leave of absence, and his replacement preferred to teach the course "live" himself while remarking "this wasn't my project, anyway."

The third school to drop chemistry via television did so with the statement that the course as presented by television was too advanced for that college's students.

Up to this point, the discussion has centered around why certain courses were not used by various of the participating colleges. It is obvious from the utilization charts presented, however, that the majority of the schools did use most of the courses. And this has continued to be the pattern. Why and how these courses have been employed should now be considered.

The reason for using TEMP-produced courses in the classroom has stemmed, almost without exception, from a desire to add to the quality of instruction. The format calling for two television lectures and one "live" classroom discussion each week permitted the students to benefit from the thinking of two qualified instructors. Since each television instructor was given full released time to prepare one course, and since the instructor had the resources of a graphics studio to prepare visual teaching aids for him it followed that more preparation went into each lecture than is generally the case for "conventional" instruction. These factors combined with television's ability to give each student a front row seat all contributed to upgrading classroom instruction.

During TEMP's first full year of operation (1961-62) fully qualified instructors at each college viewed the television presentations along with their students. This, of course, did not result in any saving of classroom teaching time. But it did have positive results. A professor of "American History" with considerable teaching experience remarked that as a result of watching someone else with adequate perparation time teach the course he realized how out of date some of his own lecture notes were.

At St. Edward's University, The Reverend Paul Bailey, C.S.C., serves as both Director of Testing and Guidance and as the classroom instructor for psychology. Father Bailey reported that following his own viewing of the complete presentation of TEMP's "Introduction to Psychology," he no longer found it necessary to be in the classroom on television days and thus had available valuable time to devote to his student counseling duties.

Texas Lutheran College lost its only instructor in psychology but was able to continue offering the course via TEMP with a member of its sociology department conducting the once-a-week discussion periods.

Southwest Texas State College found the combination of instructional television and live discussion so desirable in the teaching of German that it scheduled all of its freshman German classes to coincide with the network schedule for "Focus on German."

Consultation with classroom teachers indicated that utilization workshops were needed to help these instructors gain insight into more effective techniques. In some instances the teachers needed more than anything else assurance that TEMP was not going to bring about technological unemployment. In the course of the workshops held early in the second semester, 1962, two questions arose frequently. One was, "What is the role of the classroom teacher when his course is taught by television?" and the other, "How do you cope with student dissatisfaction over not being able to ask questions while the TV set is on?"

The first question was asked most frequently by history and mathematics instructors from those schools which did not offer graduate work. As they pointed out, graduate students were not available to sit in on the televised sections to answer questions during each period's ten to fifteen minutes after the video tape portion ended. They also commented that freeing them, the classroom instructors, from two hours of lecture per week did not make them available for graduate instruction since their schools offered none. However, investigation did reveal that these instructors could make good use of the free time given them through the utilization of television by either using it to prepare more thoroughly for the live discussion periods or by taking advantage of the time to work on advanced degrees or to assume administrative duties.

The second problem, student questions during the course of a television presentation, was met in two ways. The mathematics instructors were unanimous in feeling that students should be given the opportunity to ask questions immediately following the television presentation and that a 45-minute video tape did not leave enough time in a 50-minute classroom period for students' questions. Consequently, the format for the second semester of mathematics was changed to a 30-minute TV presentation three days a week as opposed to 45 minutes twice a week. In other courses, notably history and psychology, the teachers agreed that those questions asked by students on television days were generally unnecessary. Some suggested that students often raised their hands not so much to seek information as to impress the instructor with a statement. The concensus was that the students themselves needed to learn to utilize instructional television. It was further pointed out that in a large "live" lecture section there was seldom opportunity for student questions.

The workshops also brought out the point that the classroom teachers themselves were not conversant enough with the content of the televised lectures to realize that the majority of the student questions were answered by the television instructor himself in due time.

The fall semester of the second year (1962-63) witnessed a general decline in the utilization of TEMP offerings, but the second semester (spring, 1963) saw a return to the previous year's level of utilization. The fall decline came as the result of at least two factors with change in administrative personnel at some of the colleges being one of the prime causes. But as these new administrators came to realize the value of instructional television, utilization increased in the spring of 1963. There were clear indications, also, that the other factor causing a decline in classroom use of TEMP courses was a reaction to what one administrator termed "TEMP's one-sided programming." The reference was to the lack of supplementary or enrichment offerings. During the course of the fall semester of 1962, the TEMP Program Advisory Committee made concrete plans for the development of supplementary materials in several content areas. That the utilization decline did not mean an abandonment of the project was made evident by the fact that all eleven colleges agreed to increase their participating payments to the project.

At the time of this writing, TEMP has completed its second full year of operation. They have been a successful two years. From our experiences during these eighteen months of instructional television programming we are able to summarize the following points concerning classroom utilization on the college level:

1. The original decision to use television in the college classroom is best made by the school's top administrative officials.
2. Following the decision to utilize instructional television on the part of the administration, faculty must be given guidance in its utilization role.
3. Involvement in course planning fosters utilization.
4. The strongest support from the participating colleges for this particular project has come about through instructional television's ability to add qualitatively to classroom instruction.
5. Direct classroom teaching alone is not all that TEMP's participating colleges want; a generous offering of supplementary or enrichment materials is also desired.

CHAPTER VI

FACILITIES FOR INSTRUCTIONAL TELEVISION

The Texas Educational Microwave Project -- TEMP -- is, in terms of equipment, a network of eleven "affiliates" covering approximately 100 linear miles. The affiliates are in reality the eleven Central Texas colleges and universities which participate in the project. It is entirely a closed-circuit operation devoted to television instruction on the college level.

The system's studio production facilities are on the campus of The University of Texas in Austin. TEMP as an organization does not own the two studios on the Austin campus nor does it own any of the associated production equipment in them. It does, however, have the use of the facilities while sharing them with KLRN, Channel 9, and The University of Texas' own campus closed-circuit operation. The studios are both equipped with image orthicon cameras: three RCA, TK-31A cameras in one studio and two Marconi Mark IV (4 1/2") cameras in the second studio. A normal complement of film and slide chains as well as other associated professional equipment is on hand with each studio. Three Ampex video tape recorders are also present, although these machines must be shared also with KLRN and The University's campus system.

All instructional materials presented over TEMP are first recorded on video tape. The choice to use video tape was made after weighing the possibilities of direct film, kinescope, video tape, or no recording at all -- that is, live presentations. The higher cost of film and the lesser quality of kinescope combined with the inability to erase and reuse stock from either contributed to a decision against these two forms of television recording.

Some faculty representatives from the participating colleges spoke in favor of live presentations at first, feeling that any form of recording would tend to freeze the instructional lectures. It was discovered, however, that this feeling stemmed in large part from a lack of information concerning video tape. They were unaware of the flexibility afforded by this means of recording. Demonstrations of the ease with which video tape could be erased, corrections made, and the tape reused eliminated objections to this means of recording. The question remained, however, in the minds of some faculty members as to why any need to record the lectures existed.

The argument was presented that since college instructors were accustomed to repeating the same lectures each semester there was no reason they could not continue to do so live from the television studio. Such live presentations, the argument went, would permit constant updating of lecture material.

The counter-argument pointed out that rarely does course content change significantly from one semester to the next and that in those instances in which new findings did call for additions or corrections in lectures, video tape made such changes easy. But more convincing points favorable to the use of recorded lectures centered around the facts that once the lectures were recorded the television instructor was free to pursue other duties except for those times when revision was necessary; video tape would permit the instructor to monitor his work before it was presented to students; and the production of the lectures could take place at hours convenient to the instructor.

As the project progressed resistance to the recording of the instructional materials disappeared and today only the positive benefits of using video tape are in evidence. Pre-recorded lectures give considerable flexibility in scheduling. Dr. L. O. Morgan teaches freshman chemistry twice daily over the system while conducting live graduate classes at the same time. Dr. LeRoy Shaw gives instruction in beginning German four times each television day while doing research in Europe. Similar examples are available for all TEMP television offerings.

One other advantage gained through pre-recording the lectures is that this method permits the television instructor to be in the classroom at the same time that students view the presentation, thus allowing the instructor to observe closely student reaction to the material.

On leaving the video tape machine housed in the television production studios of The University of Texas, the signal travels via microwave relay to the ten other participating colleges in the project. The network consists of 20 hops of microwave with origination points in both Austin and San Antonio, Texas. The system is made up of a two-way "round-robin" between The University of Texas campus in Austin, and the San Antonio distribution point. A signal fed from Austin, for example, not only travels to San Antonio, but also returns to Austin to be monitored there. Thus, the "round-robin" feature permits the engineer on duty in Austin to know immediately if the signal has completed the circuit. This feature alone, however, does not give indication of the location of any technical trouble which may develop.

At the time the system was first installed, fault finding and reporting equipment was not available. The absence of this element of the system was reflected in delays in correcting system failures during the first semester of

1961. However, once this equipment was installed, the number of television classes missed because of system failure greatly diminished. The three commercial television stations in San Antonio can each feed into the San Antonio distribution point located atop the Hildebrand Street water tower. However, at the present time, all feeds originate from Austin.

All of the microwave equipment operates in the business service bands, either 6575-6875 or 12200-12700 mc. The lower frequencies are used for long-haul intercity transmission, the higher frequencies are for the shorter intracity hops.

A question visitors to the system frequently ask is "Why do you use microwave?" The question normally implies one of two alternatives: the use of coaxial cable or the use of open broadcast. In reference to coaxial cable, conservative estimates placed the cost of installed cable at one dollar per foot. The TEMP network stretches over 100 miles. In other words, cable would have cost approximately twice as much as did the microwave installation. There is also the added fact that cable would have introduced picture degradation considerably beyond that found in microwave transmission.

The choice of closed-circuit for TEMP instead of open broadcast was based on the size of the audience served. This project was and is designed exclusively for use in the college classroom. The combined enrollment of the eleven participating colleges and universities in the system is approximately 38,000 students. The system operates on an average of six hours per day plus two hours in the evening. If the area's one educational VHF channel was used for this it would, in effect, rob the area's 250,000 school children of an educational television service. The educational VHF channel -- Channel 9 -- which now serves the Austin-San Antonio sector would also be limited in its hours available to present programs for at-home adult viewing if this channel were being used for the classroom instructional materials now given via TEMP.

While the microwave network delivers sound and picture to each of the participating schools, the distribution of the signal into the classroom is by coaxial cable running from the receiving "station" to standard 23-inch television sets. It has been concluded that this was a bad choice, and recommendations are being prepared suggesting a change to video monitors and separate loud speakers. The decision to use RF distribution systems -- that is distribution via standard home receiving TV sets -- on each campus stemmed from lower cost in relation to a video monitor system combined with the fact that the standard television receiving sets employed by the RF system would permit the colleges to receive the Channel 9 educational station's signal also.

The reasons for terming the use of RF distribution a "bad choice" relate to both equipment malfunctions and to less sound and picture quality than would have been available had video monitors been employed. The modulators required in the distribution were responsible for twelve service calls during the first semester of operation, and the receiving sets alone resulted in seventeen service calls. However, only two of the above seventeen calls required the replacement of component parts in the TV sets. All other calls were because of set maladjustment which in many instances came about through human error. An inventory of these "maladjustments" would include sets tuned to the wrong channel; use of contrast control instead of "off-on" knob to turn set off; power plug removed from wall socket; improper or inadequate use of fine tuning; along with several other practices.

The TEMP engineering and production staffs consulted with the proper personnel of each participating school concerning the number and location of receiving sets for each classroom. The general rule was a minimum of two receivers per classroom with one receiving set for each group of 25 students. In other words, three receivers would be considered minimum for a class of 50 students. Room configuration, of course, had to be taken into consideration in each case, not only for problems of sight lines but also because of varying acoustical properties of the various classrooms. Optimum height of sets above the floor was placed at 60 inches. Recommendations were not always followed, however. At least one college mounted its receiving sets on hangers only a slight distance down from the classroom ceiling resulting in students experiencing both neck and eye strain while viewing. All of the participating schools bought the recommended 23-inch receiving sets, and the majority of the colleges closely followed recommendations in receiving set number and location in the classroom.

In closing, it should be pointed out that objections to picture and sound quality on the part of classroom teachers have been extremely few. In most instances such objections have, upon analysis, been traced to failure on the part of the instructor to adjust the sets in the classroom properly. The strongest plea for video monitors has come from TEMP's engineering and production staff reflecting the desire for the highest possible quality.

CHAPTER VII

FINANCIAL ASPECTS OF TEMP

At the time TEMP -- Texas Educational Microwave Project -- was conceived as a system to interconnect eleven Central Texas colleges and universities for closed-circuit classroom instruction, only slightly "educated guesses" were available concerning costs. The microwave installation, as designed and built by Collins Radio, bears serial number I. Costs were learned, to a very real extent, by doing.

The money to meet these costs has come from three sources: participating payments by the eleven colleges involved; from funds provided under contract with the United States Office of Education, Title VII-B of the National Defense Education Act; and from The Ford Foundation. Some equipment and facilities were also provided by commercial television stations in the project area.

The U. S. Office of Education has been the largest dollar contributor to the project, and it was this money that made the physical system possible. Of the $369,812.00 provided under the educational media program (Title VII-B, National Defense Education Act), $225,000.00 was spent for the main microwave system which became operable in September of 1961. Prior to this date, the equipment for a three-campus pilot operation had been leased from Collins Radio bringing total equipment cost to $234,082.00.

Since the beginning of the full eleven campus operation -- a network covering slightly over 100 miles -- fault-finding and reporting as well as standby battery power equipment has been installed.

In addition to microwave equipment, the partial salaries of project personnel and program production supplies came from the contract mentioned above.

Grants from The Ford Foundation were made to those four institutions providing television studio instructors for the original eight courses offered over the network. These grants covered the release-time salaries of the eight instructors whose lectures were recorded on video tape, thus enabling them not only to devote full time to the original preparation and production of the TEMP courses but to allow also for release time for the later production of any portion of courses in which corrections or minor changes might be found necessary. The amounts of these grants were based on the full-time salary of the instructor at his resident college or university.

Operating funds for the system have come from the participating institutions. Ten of the schools have contributed $2, 000. 00 each per year with the eleventh, The University of Texas, contributing $10, 000. 00 per year. This gave the system an annual operating budget of $30, 000. 00. The system was able to operate for the first two years on this limited budget only because it was possible to pay some of the salaries of operating personnel from contract money from the U. S. Office of Education. With the full realization that this contract money would not always be available, the system's administrative council composed of the presidents of the eleven schools voted in December, 1962, to assume a larger operating budget with participating payments based on continuing the same annual payment plus an increase based on gross student enrollment. The formula agreed upon will make available an operating budget slightly in excess of $40, 000. 00 as of September, 1963. Before presenting details concerning the TEMP operating budget, it might be well to point out that detailed construction figures have not been presented because installation costs can vary widely depending on local conditions and that each participating school paid the cost of its own campus distribution system.

The microwave network as such delivered both video and audio signals to a terminal point on each campus. From this terminal, each participating institution was responsible for the purchase and installation of its own distribution system. This system consisted of at least one $800. 00 monitor, standard television receiving sets, RG1-11-A coaxial cable, and associated connectors and other "hardware." The average cost per campus was $1, 500. 00. Variations in cost stemmed from amount of coaxial cable used and the number of classrooms equipped with receiving sets.

Since no outside money was available for the purchase of video tape, it was decided that each institution from which a television studio instructor had been selected would buy the video tape on which the instructor's lectures were to be recorded. This meant that San Antonio College with two instructors on the system paid approximately $18, 000. 00 for tape, and St. Mary's University and Southwest Texas State College with one instructor each bought tape in the amount of $9, 000. 00 each. The University of Texas had four instructors on the system.

In arriving at the original operating budget, estimates were made of what have now become close to fixed costs. These include power, travel, replacement parts, video tape machine operating costs, communications, and office supplies, as well as lease payments on microwave tower sites, upkeep for two maintenance trucks, engineering assistance, and minor technical improvements. With time and experience along with the expiration of outside contract funds, the participating colleges have now assumed a $40,000.00 budget which for 1963-64 reads as follows:

Engineering Salaries	$16,308.00
Travel	1,600.00
Power	1,200.00
Replacement Parts	1,300.00
VTR Operating Costs	3,192.00
Social Security	700.00
Communications	800.00
Office Supplies, Duplicating & Postage	900.00
Tape Amortization	3,000.00
Technical Improvement	4,000.00
New Course Development	7,000.00
	$40,000.00

Engineering Salaries include two microwave engineers who devote full time to system maintenance plus a full-time Video Tape Recording engineer responsible for both the playing back of instructional tapes over the system and the recording of new material.

Travel requires less money today than was the case three years ago. There is slightly less need now for frequent visits to the participating schools by the Project Director. This budget item was also used to reimburse instructors from outside Austin who traveled to the production studios at The University of Texas to produce and record their lectures.

Power has remained a fixed cost. Payment is made to various electrical companies along the system path.

Replacement Parts refers to the main system only. Each school bears the maintenance cost of its own campus distribution system.

VTR Operating Costs stem from "head wear" on the video tape machine along with necessary replacement of component parts in the recorder.

Communications costs, like travel, have declined. There are two reasons for this. One, improvement of technical operation has greatly reduced the need for individual schools to telephone long distance to report technical difficulties and two, the installation of a "hot phone" which operates on a sideband of the microwave carrier makes communication with the San Antonio end of the system less expensive.

Office Supplies, Duplicating and Postage have decreased slightly during the two full years of system operation. This figure was necessarily high for the first year because of the necessity of duplicating teacher manuals for the system's eight courses. The cost of the monthly TEMP Newsletter is also met through this budget item.

Tape Amortization is an item which appears in the 1963-64 budget for the first time. As previously pointed out, those institutions which supplied television studio instructors purchased the video tape on which the instructional lectures were recorded. This was necessary because no other funds were available. But this did mean that one school might pay into the system in excess of $18,000.00 as opposed to another school's payment of $2,000.00 in one year. It is obvious that the small amount budgeted for tape amortization by no means brings the individual payments back into balance, but it is a start in that direction.

Technical Improvement funds for the 1963-64 year are marked for microwave tower painting in keeping with CAB regulations as well as for additional battery standby power.

Course Development represents the second largest item in the budget. Again, there is more than one reason for this figure. After two years of utilization, we know with reasonable certainty what adjustments need to be made in some of the existing course offerings. A part of this budget item will be used for production changes in existing courses. To date, TEMP has relied heavily on lectures designed for direct classroom instruction. While the use of this material has been satisfactory, the need for the inclusion of supplementary teaching materials is also recognized. The development of this material will be made possible through the course development money.

Administrative and technical supervision salaries are not met by the TEMP operating budget because of the limited funds. The Technical Supervisor and the Director of Radio/Television devote a considerable amount of their time to TEMP without compensation through TEMP.

It should also be pointed out that a great amount of time and effort has been expended by the administrative heads of the participating colleges and universities both in bringing TEMP about and assuring its continued operation.

Perhaps TEMP's most meaningful money figures relate to cost-per-student. Using the figure of ten dollars per credit hour, which is at present the accepted cost of a basic course in institutions of higher education (costs of courses at The University of Texas range from $10.36 to $91.00 per credit hour) and using the average of two credit hours per student, the present television load per student in the TEMP system, we arrive at the formula for the approximate dollar value for instruction: $10.00 x 2 hours x TEMP student enrollment.

To date, 11,725 students have received instruction for credit via TEMP. Thus, $20.00 x 11,725 gives us instruction valued at $234,500.00. This figure is $418.00 more than the cost of the physical system as originally installed. Thus, in terms of initial capital outlay, the total amortization of the physical system has taken place.

However, the physical system which distributes the TEMP signal represents capital outlay rather than instructional cost and because of this fact it does not seem in order to evaluate cost-per-credit hour in terms of physical plant. Universities and colleges do not include the cost of buildings in determining their instructional costs.

As of June, 1963, a total of $426,823.00 has been expended for instruction via TEMP. This figure includes the production costs for the original eight video taped courses plus a ninth course produced after the system became operable in September of 1961, cost of operation over a four-semester period, and administrative salaries or their equivalent in contributed time. It should be kept in mind that while the instructional value received as given above will double every two years, instructional costs will not increase rapidly due to the fact that major instructional expenditures were met during the initial two-year period with the production of courses.

The doubling of instructional value assumes no increase in average enrollment. With the anticipated slight increase in number of students in TEMP classes, all instructional costs will have been amortized by the end of the fourth year of operation. Increased enrollment does not increase instructional cost, but does, on the other hand, decrease it.

The following table will illustrate:

	Instructional Cost	Enrollment	Instructional Value
1961-63	$426,823	11,725	$234,500
1961-65	506,823	23,450	469,000
1961-66	546,823	29,312	586,240

After the fourth year of operation, instructional costs per credit hour drop significantly below the conventional $10.00 figure. That the above figures are estimates is readily admitted, but they are based on conservative projections.

Another valid way of examining the cost-per-student aspect of TEMP is in terms of the participating payments made by the colleges and universities involved in the project. During the first full year of system operation, San Antonio College enrolled 972 students in TEMP courses. San Antonio College's participating payment for the year was $2,000.00 in return for which it received $19,440.00 in televised instruction. Even if we consider the fact that San Antonio College, as did the other participating institutions, contributed

$1,500.00 in the spring of 1961 prior to system operation and also paid out another $1,500.00 for its campus distribution system, money disbursed ($5,000.00) was still some $14,000.00 less than the value of instruction received.

The system is far more important than its dollar and cents values to the participating schools, however. Many unexpected benefits have been received. One example of an educational plus value took place at Texas Lutheran College in Seguin. This small school, as is the case with several others in the system, has a one-teacher psychology department. When this teacher was unexpectedly "frozen" in the military, the school faced the problem of hiring a temporary teacher or doing without. At the psychology teacher's suggestion, the school elected to use the TEMP psychology course with an assistant teacher in the classroom. Thus, the school was able to offer beginning psychology although the regular instructor was serving in the armed forces.

It has never been TEMP's intention to save money by eliminating the classroom teacher. One of the project's prime purposes has been, however, to make possible the redeployment and meaningful utilization of existing faculty. Another example involving the TEMP course in psychology will illustrate. At St. Edward's University the same faculty member both taught the beginning course in psychology and served as Student Counselor. With the advent of TEMP, this faculty member discovered that the televised portion of the course (two hours per week) freed him from both lecture preparation and the lectures themselves, thus giving him four additional hours per week to devote to counseling students.

It follows, of course, that dollar evaluations could be placed on both the Texas Lutheran College and the St. Edward's University utilizations. Each of these two schools paid $2,000.00 annually, but received seven other televised courses in addition to psychology. Consequently, they were in fact paying only about $285.00 per course.

At first glance the figure of $10.00 per credit hour may seem too low an evaluation to place on some of the instruction given through TEMP. The cost-per-student figure of $10.00 per credit hour is based on "straight lecture." "Focus on German," the beginning German course offered on the system, features dramatic episodes employing from three to four German-speaking actors in each television presentation. The payroll for these actors along with other production costs would tend to raise the minimum figure used to one nearer, say, $15.00. However, actual figures illustrate that the cost-per-credit hour via television is less than that of conventional lectures for German.

"Focus on German" was the most costly instructional series produced for the project because of the use of actors and because of the large number of graphic devices employed. A cost accounting for the production of this series runs as follows:

Salaries (instructor, full time, and part-time production staff)	$14,202.00
Studio facilities use	14,580.00
Production materials and props	120.00
Printing costs	480.00
Recording costs including tape stock	9,644.55
Actors' wages	2,180.00
	$41,206.55

This course, as is true of others offered on the TEMP network, is in fact utilized by two closed-circuit teaching systems: TEMP and The University of Texas' own instructional television system. While The University of Texas participates actively in TEMP, its separate campus system, necessitated by The University's large enrollment, also offers courses produced for TEMP at hours beyond those available on the TEMP schedule. During the academic year 1961-62, 902 students received 3 credit hours of instruction per week through the "Focus on German" video tapes. The number of students viewing via TEMP and the number viewing via The University's separate campus system was about evenly divided: 491 during hours scheduled on TEMP and 411 during other University hours. By tripling the student enrollment because three credit hours were involved and dividing this number into the production cost for the series ($41,206.55) the first year's cost-per-student is reached: $15.22. The Department of Germanic Languages at The University of Texas reports a figure of $15.00 per credit hour for this course taught in the conventional "live instructor" manner.

However, the foregoing costs are figured on a one-year only basis. Scheduling is now underway for the third consecutive year's utilization of "Focus on German." To date, 1,500 students have enrolled to be taught German by this instructional television series. Since the original production costs were incurred, additional costs in the amount of $8,224.00 were met to make production changes in nine of the previously recorded lectures. By the end of the academic year, $49,430.55 had been expended on production costs for the series. This figure divided by 4,500 (the number of credit hours provided by the series) gives a cost-per-hour figure of slightly over $10.00 per credit hour. Let us assume that during the school year 1963-64 only 200 students enroll in German classes receiving instruction via "Focus on German" (the yearly average has been 750 students); this would mean that in three years $51,000.00 of instruction would have been made available for a production expenditure of $49,430.55. The $1,569.45 difference between instructional value received and production costs incurred would more than pay for depreciation to the video tape machine used in playing back the series.

As another example, the production costs for the TEMP series "American History" came to $35,156.00. This course provided four credit hours per year per student as opposed to the three hours per year in "Focus on German." As of June 1963, 2,042 students had received instruction via TEMP's "American History" at a per-credit-hour cost of $4.30.

These two courses, "Focus on German" and "American History" represent expensive and average production. They illustrate that within four to five semesters production costs have been or are within dollars of being amortized leaving the matter of annual operating costs to be considered.

Based on the approved operating budget of $40,000.00 for the academic year 1963-64, the following represent credit-hour costs for varying annual enrollment figures.

TEMP Enrollment	Cost-Per-Student
2,000	$10.00
3,000	6.00
4,000	5.00
6,000	3.33

The 2,000 enrollment figure is given only to illustrate how low enrollment could drop for the cost-per-student figure to still compare favorably with that of conventional instruction. The 6,000 enrollment figure is given because this represents a conservative estimate of the number of students who will receive instruction via TEMP in 1963-64.

No educator ever wants to economize at the cost of quality. In the light of this statement, let us conclude with these points:

1. Teachers selected for teaching TEMP courses have been those generally recognized as being outstanding in their areas.

2. Cooperating schools have enjoyed the addition of outstanding facilities available through the sharing of faculty resources over the system.

3. Release of teachers from routine classroom and laboratory instruction has permitted their redeployment for research, guidance of individual student projects, publication, and administrative functions.

4. The use of student assistants as primary lecturers in large enrollment courses now available on the system has not noticeably declined. The assistants are now used to hold question and answer review and test sessions. The departments employing television feel that this change has substantially increased the quality of their instruction and at the same time has guaranteed a uniformity of teaching beginning students.

A cost-per-student per credit hour of $3.33 is indeed low.

PART III

EVALUATION OF THE PROJECT

APPENDICES

APPENDIX A

INFORMATION FOR THE PARTICIPATING INSTITUTIONS

APPENDIX B

TECHNICAL REPORTS

APPENDIX C

EXAMPLES OF CLASSROOM TEACHER'S MANUALS

APPENDIX D

MEMBERS OF THE NATIONAL ADVISORY COUNCIL

NATIONAL ADVISORY COUNCIL

Titles given for organizations represented were those of the time of the Council's formation, 1959.

Dr. Robert C. Anderson, Director
Southern Regional Education Board

Dr. Kenneth Christiansen, Director
School of Journalism & Communications
The University of Florida

Dr. Harry J. Skornia, President
National Association of Educational Broadcasters

Dr. John F. White, President
National Educational Television & Radio Center

Mr. Allen Ludden, Director
Program Services
CBS Radio Stations

Mr. A. Earl Cullum, Jr.
Consulting Engineers

Reverend L. V. Britt, S. J., Dean
College of Arts & Sciences
The University of Detroit

Dr. Wesley C. Meierhenry, Assistant to the Dean
Teacher's College
The University of Nebraska

Dr. John Ivey, President
Learning Resources Institute

Mr. Richard B. Hull, Director
Radio and Television
Communications Lab
Ohio State University